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THE ALL-CEYLON EXHIBITION.

REPORT OF THE EXECUTIVE COMMITTEE.

Peradeniya, June 15, 1913.

In the May number we published the Report of the Executive Committee of the All-Ceylon Exhibition presented at the meeting of the Board of Agriculture, May 9th, 1913. As Mr. Harward, the Director of Public Instruction, remarked when moving the adoption of the Report, it reflects very great credit on the patient industry of Mr. A. N. Galbraith who came to the rescue of the Committee at a most critical time when the Exhibition was in full swing and Mr. Denham, the Secretary and Organiser, was taken ill and compelled to relinquish charge. It was a desperate example of changing horses in mid-stream, and that the business of the Exhibition has been wound up in such a satisfactory manner is due solely to Mr. Galbraith.

Writing of the Exhibition in our issue of October last we mentioned sound finance as one condition upon which success is to be measured. The Committee did not call upon the Society for their guarantee of Rs. 15,000 and now they are offering to return to the Government their grant of Rs. 15,000, effecting in these two cases an economy of £2,000. It is to be hoped that if occasion should arise for another appeal the public spirit shown by the Committee in these sacrifices will not be forgotten.

A sum of Rs. 7,438·48 is to be placed on fixed deposit for an exhibition to be held, it is proposed, in January or February 1917. We hope neighbouring countries will note the fact that 1917 is booked for an All-Ceylon Exhibition and arrange their programmes so as not to clash with that prospective event.

The Board of Agriculture, the executive of the Ceylon Agricultural Society, originated the idea of this exhibition and, what is more, made itself responsible for a very substantial sum of money in connection with it, yet it was not strictly speaking the Society's show, though how the eclipse of the Society came to pass is not easy to explain. Certain it is that it suffered eclipse and that its members enjoyed no privileges whatever save for the occupation of a small pavilion taken up by exhibits. Members were not even given free passes, an omission that the responsible officers of the Board will no doubt see rectified on the next occasion. The right of free entry to their shows is a privilege enjoyed by members of Agricultural Societies all the world over; is indeed one of the principal attractions Societies can offer; as what they lose in gate money they make up many times in subscriptions. The Board of Agriculture may be relied upon, we feel sure, for insisting that in 1917 members shall not be deprived of this cherished privilege of free entry.

R. N. L.

THE HON'BLE MR. EDWARD ROSLING.

APPOINTED DEPUTY OF THE BOARD OF AGRICULTURE.

The Hon'ble Mr. Edward Rosling, Rural Member of the Legislative Council and a member of the Board of Agriculture, Ceylon, of the Committee of Agricultural Experiments and past Chairman of the Planters' Association, has been appointed Deputy of the Board to the London Committee to arrange a Deputation to the Secretary of State to urge the claims of Ceylon as a suitable site for an Imperial College of Tropical Agriculture.

Mr. Rosling sailed by the O. L. "Orontes" on May 15th.

MOZAMBIQUE: ITS AGRICULTURAL DEVELOPMENT.

IN the ever increasing outturn of books dealing with tropical agriculture, either general or special, it is indeed refreshing to meet with one which clearly demonstrates a firsthand knowledge of the subject with which it deals. "Mozambique : its Agricultural Developments" by Mr. R. N. Lyne, F. L. S., F. R. G. S., formerly Director of Agriculture of Mozambique, and of Zanzibar, and now Director of Agriculture, Ceylon, is the result of eighteen months' exploration of the Province with the express purpose of ascertaining its agricultural possibilities, and it reveals in every chapter the author's fitness for the task and the thoroughness with which his investigation was carried out. Representing the observations and deductions of a skilled agriculturist, the book is replete with just that information which the intending settler or investor requires.

The author has taken no narrow view of his subject. The first six chapters contain a complete account of the geographical features of the various districts, with details of the characters of their soils and suggestions as to the products best suited to each. As the country extends through some sixteen degrees of latitude, its districts necessarily vary considerably in climatic conditions and consequently in their possibilities from the planter's point of view ; and a study of these chapters, compiled chiefly from personal observations, will prevent the new settler from embarking upon enterprises which have slight chances of success. Rainfall, water supply, irrigation, and transport are all considered, while the strictly agricultural point of view is varied by explanations of the origin of the physical features peculiar to the country. In addition to its agricultural value, this section is of special interest to geographers.

Sugar appears to be the most promising crop and the most valuable at the present time, the output for 1911 being about 27,600 tons, though it is pointed out that more might be made of the area already under this product by the adoption of improved methods of cultivation. Coconuts have been planted fairly extensively, the total number of trees (excluding those on the two Companies' territories) being estimated at about three millions; but though some trees are said to have yielded 150 nuts each at one picking (quarterly pickings) the general average is low, and it is concluded that the Province (within the limits stated) is not a first class coconut country.

In Mozambique, as in other parts of East Africa, Ceara rubber has been planted, though only on a small scale, and as a rule the plantations are not being successfully worked. There is, however, one plantation which promises to be a success, and of this the author gives particulars which should prove useful to those who are endeavouring to realise the hopes once based on Ceara. Yields of ten ounces have been obtained from six-year-old trees, tapped experimentally for 92 days.

"The principle of stabbing or pricking is now generally accepted as the most successful system for the East Coast of Africa, but it is important that this system should be applied in the right manner. The stabs should be made with the flat of the knife held horizontally, not vertically, as was being done in this case, and they should be made close together. The trunk of the tree may be divided for the purposes of tapping into two or three parts,

vertically, each part being subdivided laterally into three or four sections according to the girth of the tree. This will provide for from six to twelve tappings, one section being taken at a time. Tappings may follow one another for three or four days, and then an interval of a fortnight or twenty days allowed to intervene. This may continue for as long as the tree is in leaf, which may be, perhaps, nine months out of twelve. A 3-per-cent. solution of acetic acid brushed on the trunk of the tree before tapping may be used as a coagulating mixture, but carbolic acid, which makes the rubber harder, is now being used in German East Africa, either by itself or mixed with acetic acid. As is well known, the juice of citrus fruit and a solution produced by boiling the pulp surrounding the seeds of the baobab tree are also efficacious as a coagulant, especially if carbolic acid be added. The strength of the mixture must be regulated according to the weather ; a more concentrated solution being required when the weather is wet and the latex watery; and the manner of applying it to the tree must be carefully observed ; the surface below the section to be operated on being well dressed to prevent the latex running through to the ground and getting mixed with sand. Coagulation may take place almost at once, or after some hours. Calcium Chloride is now coming into use as a coagulant, mixed in the proportion of 100 grammes to 1 litre of water, each man being given 8 litres of the mixture daily. The best method of collecting the rubber is by rolling it on a stick or small roller. In this way both hands can be used and the rubber pulled away from the trunk to avoid any bark getting in. The method of treatment afterwards varies. In some cases the rubber is sliced and soaked in water for a few hours to get the smell of the acid out, and then laid out on tressellated shelves in the shade to harden. In others it is put through a washing-machine and rolled into sheets."

Ceara rubber planters in other countries should find the information on this product of great value.

Other products described include Sisal Hemp (already successfully grown in certain districts), Mauritius Hemp, Tobacco, Cotton, Maize, Ground Nuts, Wattle, Lucerne, Fruits, Vanilla, on all of which valuable hints are given as to methods of cultivation and the best varieties for commercial exploitation. The natural resources of the country also receive attention, and the chapter on the Landolphia forests, the chief source of Mozambique rubber, gives what is probably the first detailed account of the working of the Mozambique rubber industry.

The author points out that one of the limiting factors to the development of Agriculture in East Africa is the difficulty of procuring labour, and this side of the agricultural question is fully discussed. The system of land tenure, too, is clearly explained and its advantages and disadvantages indicated without fear or favour. Though the land laws appear to be somewhat complicated, this exposition will serve to make the position clear to intending planters, and do much to remove the idea of insecurity which has hitherto restrained the investment of foreign capital in the Province.

The book should prove of the highest value to all, whether officials or planters, connected with agriculture in Mozambique, and will also afford an example of the kind of work required of those whose business it is to direct the course of agriculture in unexploited countries.

T. P.

TOBACCO.

TOBACCO CULTIVATION IN THE NORTHERN PROVINCE.

By S. CHELLIAH,

AGRICULTURAL INSTRUCTOR, N.P.

Tobacco is extensively cultivated in almost all parts of the Northern Province in high lands; and in paddy fields immediately after the paddy harvest. The total area of land under tobacco in 1912 was 6,743 acres. A map of the Northern Province showing the villages where tobacco is grown is annexed. Tobacco leaves, when cured are used both for smoking and for chewing. The extent of land under the cultivation of smoking tobacco in 1912 was 1,339½ acres and that under the cultivation of chewing tobacco, in the same year, 5,404 acres.

Next to paddy, tobacco cultivation is the chief industry of the people of the Northern Province.

SOIL.

The smoking variety of tobacco is cultivated in light loamy soil, and the chewing variety in heavy loam.

The cultivation of tobacco begins about the end of October and continues till the end of May. The plants are first raised in nurseries and then transplanted in the field.

NURSERIES.

A small plot of ground is selected for the purpose slightly raised above adjoining ground. Decayed leaves and rotten cattle manure are applied in abundance, and the soil turned over and over until it is reduced to a fine tilth. The ground is then levelled and the seeds, to secure equal distribution over the ground, are usually mixed with fine sand and then sown. After the soil has been slightly stirred by the finger so as to bury the seeds to a proper depth it is pressed down firmly and water is then gently sprinkled over it. The beds are then covered with coconut or other leaves to protect them from the hot sun. They are carefully watered twice a day until the seedlings are transplanted. Care is taken that the seedlings receive sufficient light and air for their healthy growth. They remove therefore the leaves spread over the beds and erect a canopy called a "pandal." This consists of small sticks, two or three feet high, planted four feet apart all round the edges of the beds and having light sticks fastened along and across. Over this framework olas and cadjans are spread in order to protect the seedlings from the hot sun and the heavy rain, and when the seedlings show signs of vigorous growth the "pandal" is removed. The seedlings are fit for transplanting in about two months.

The present method of watering the beds causes the hardening of the top soil and thereby prevents the free circulation of air in the soil preventing the healthy growth of plants. A better method would be to dig small trenches skirting the beds to lead water to the roots of the plants through percolation, preventing the caking of the top soil.

PREPARATION OF THE LAND.

The soil is turned over and over one foot deep with hoes and then manured by penning stock—mostly sheep and black cattle. Green leaves, mostly collected in distant places, are then brought in cartloads and buried into the soil. After cattle manure is again applied, the soil is turned over and levelled and sites for seedlings are marked on it at distances of three feet apart.

The system now in vogue of applying green leaf manure is very expensive, as the leaves are usually collected from live fences and jungle at considerable distance and taken to the fields by cartloads instead of growing the necessary green leaves on the ground as is done in other parts of the world. Years back, a cartload of green leaves was sold at rates varying from Rs. 2-50 to Rs. 5, but now it has gone to Rs. 10 and upwards. A cartload of *Tephrosia purpurea* which is considered the best manure for smoking tobacco is sold at Rs. 20 to Rs. 30. Cultivation in Jaffna is not said to be a paying concern, and it is mostly due to the cost of manures becoming very prohibitive. The growers could save a great deal of money if they adopted the system of growing green crops on the tobacco land and then burying the leaves so grown into the soil intended for cultivation effecting a saving both in labour and expenditure.

TRANSPLANTING.

When the land is thus made ready for the plants, the seedlings are removed carefully from the nursery in an evening and planted in the holes previously marked and watered for this purpose. The same day or next morning, the plants are shaded with green leaves. The plants are watered regularly twice a day until they recover from the shock of transplanting and then twice a day till they show signs of vigorous growth. When the plants are about six inches high, the shades are removed and the soil around seedlings stirred with a small wooden spade to secure free circulation of air. The water channels are then made at convenient distances between the plants with smaller channels leading to the plants, by means of which water is led to the plants without wetting the intervening spaces between them.

AFTER-CULTIVATION.

Cattle manure is again spread over the ground or sheep are penned among the plants, precaution being taken by enclosing each plant with young palmyrah olas to prevent them from being injured by sheep. The whole ground, after being manured, is watered and thoroughly tilled and weeded, and then beds are so formed that all plants stand on small ridges with necessary water channels for watering them. The ridges made for the plants being too small both in breadth and height the tobacco is stunted in growth and becomes the prey of disease.

TOPPING AND SUCKERING.

When the plants are about to blossom, the flower stems are cut off with a view to diverting all the available plant food into the leaves. From eight to ten leaves are left to mature according to the character of the plant and the quality of tobacco aimed at. The topping of plants produces several suckers at every axle of the leaves and these have to be carefully removed.

HARVESTING.

The time for harvesting is a matter for judgment and experience. The man who knows his business will, by looking at the field, be able to note a change in the colour of the leaves which tells him that they are ready to be picked. A common test is to fold a leaf between the fingers ; if it breaks across or retains a crease it is considered ripe. It is important that the leaves should not be harvested prematurely or allowed to remain till over-ripe. When the plants are ripe, they are cut and allowed to wilt in the sun.

CURING.

Smoking tobacco is cured in the following manner :—The wilted plants are removed to a shed and hung there for about 24 hours. Then the leaves are separated from the stems and buried in a heap in pits dug in the ground for this purpose and carefully covered with earth and allowed to remain so for three days. On the fourth day they are taken out and after being exposed to the air for some time they are again put into the pits, the position of the leaves being changed. On the first occasion the top leaves are kept converging towards the centre, and on the next occasion the bottom leaves are kept in that position. This precaution becomes necessary so as to procure a uniform fermentation in all parts of the leaves. On the third day the leaves are taken out of the pit, sorted according to quality and size and then tied up in hands :—tufts of five leaves. These hands are hung up in curing sheds. In some places this tobacco is artificially dried by fire and in other places it is allowed to dry in the natural way.

After the leaves are well dried up they are taken out of the curing sheds and tied into bundles of fifty leaves. They are then stacked in heaps and well covered with mats. Once a week they are again taken out and after being left to air for some time re-stacked until the leaves are well cured and become fit for market.

The chewing tobacco is cured in the following manner :—The leaves of wilted plants are cut separately and stacked in heaps with weights on to accelerate fermentation. On the fourth day the leaves are sorted according to size and quality and then made into hands of five leaves, hung up in air-tight curing sheds and dried there by fire. On the following morning the leaves are taken out and stacked into a heap. On the third day the leaves are again hung up in the curing shed and dried again by fire. When the leaves become quite dry they are taken out, heaped up and well covered with mats. The leaves in the heap are from time to time taken out and after being aired are repacked in a heap to increase the flavour of the tobacco.

SORTING AND GRADING.

This work is considered as important as any other work connected with the cultivation of tobacco. The whole of the crop is examined leaf by leaf and sorted separately as regards size, colour and quality. Usually the leaves

are arranged in three different grades, viz., "adichchalli," "idaitaram," and "therivu." The bottom leaves are called "Adichchalli" in the intermediate Tamil "idaitaram" and the top and the largest leaves " therivu."

MANUFACTURE OF CIGARS.

The only important manufacture from tobacco is cigars. The cigars are made in the following manner :—The best kinds of leaves are softened with water and used for wrappers and the inferior kinds of leaves for fillers. The fillers are covered over with a wrapper and the end of the cigar is tied up with thread. The cigars made in this way are tied together in small bundles of ten each, and a decoction known as "koda" prepared by boiling tobacco mid ribs and side ribs in arrack, toddy and young coconut water is sprinkled over them and they are then packed in air tight boxes. In place of fresh water for softening the leaf a light decoction of "koda" is also used. The strong decoction is sprinkled over the cigars so that it may impart flavour to them or increase the aroma which is peculiar to the Jaffna cigar. The decoction serves the additional purpose of preserving the cigars from decay and damage by insects.

SNUFF.

A kind of snuff is also prepared by roasting tobacco of the smoking variety and pulverising it into a fine powder, to which a small quantity of lime is added to increase its strength. Other aromatic substances are also added in small quantities to improve the quality and flavour of the snuff. This is made for local consumption only.

TRADE IN CIGARS.

The manufactured cigars are sent to Colombo, Kandy and Galle and to other parts of the Island for sale. They are sold according to the quality of the cigars at Rs. 2·50, Rs. 5, and Rs. 7·50 per 1,000 cigars.

TRADE IN TOBACCO.

Large quantities of chewing tobacco are exported to Travancore and Cochin in South India. The price of the superior kind per candy weighing 600 lbs. is from Rs. 200 to Rs. 300 and of the inferior kind from Rs. 120 to Rs. 200.

REFERENCE TABLES.

CHEWING TOBACCO.

N.B.—Under reference numbers C=Chewing; S=Smoking, &c.

Reference No.	NAME OF VILLAGE.	Acreage Under Tobacco.
C.1	Nayinativu	35
C.2	Punkudutivu West	43
C.3	Punkudutivu East	55
C.4	Analativu	213
C.5	Eluvaitivu	2
C.6	Karampan	132
C.7	Narantanai	80
C.8	Saravanai	66
C.9	Velanai West	25
C.10	Velanai East	34
C.11	Mankumpan	30
C.12	Allaippiddi	65
C.13	Mandaitivu	96
C.14	Chiviyateru	38
C.15	Chundikuli	12
C.16	Tirunelveli	84
C.17	Nallur	22
C.18	Kokkuvil	66
C.19	Vannarponnai	54
C.20	Kondavil	112
C.21	Manipai	15
C.22	Vaddukkoddai East	2
C.23	Vaddukkoddai West	2
C.24	Sandiruppay	18
C.25	Kantarodai	18
C.26	Chankanai	30
C.27	Tholpuram	12
C.28	Chulipuram	8
C.29	Chillalai	20
C.30	Mathakal	20
C.31	Chiruvilan	82
C.32	Pandatterippu	30
C.33	Periyavillan	80
C.34	Mahiyappiddi	5
C.35	Alaveddi	110
C.36	Sankuveli	15
C.37	Uduvil	85
C.38	Chunnakam	125
C.39	Inuvil	170
C.40	Maviddapurum	40
C.41	Varuttalaivilan	135
C.42	Tellippalai	100
C.43	Mallakam	85
C.44	Elalai	305
C.45	Punnalaikkadduvan	285
C.46	Urelu	9
C.47	Urumpiray	50
C.48	Koppay North	35
C.49	Irupalai	9
C.50	Koppay South	84
C.51	Palai	72
		3320

CHEWING TOBACCO.—(*Continued.*)

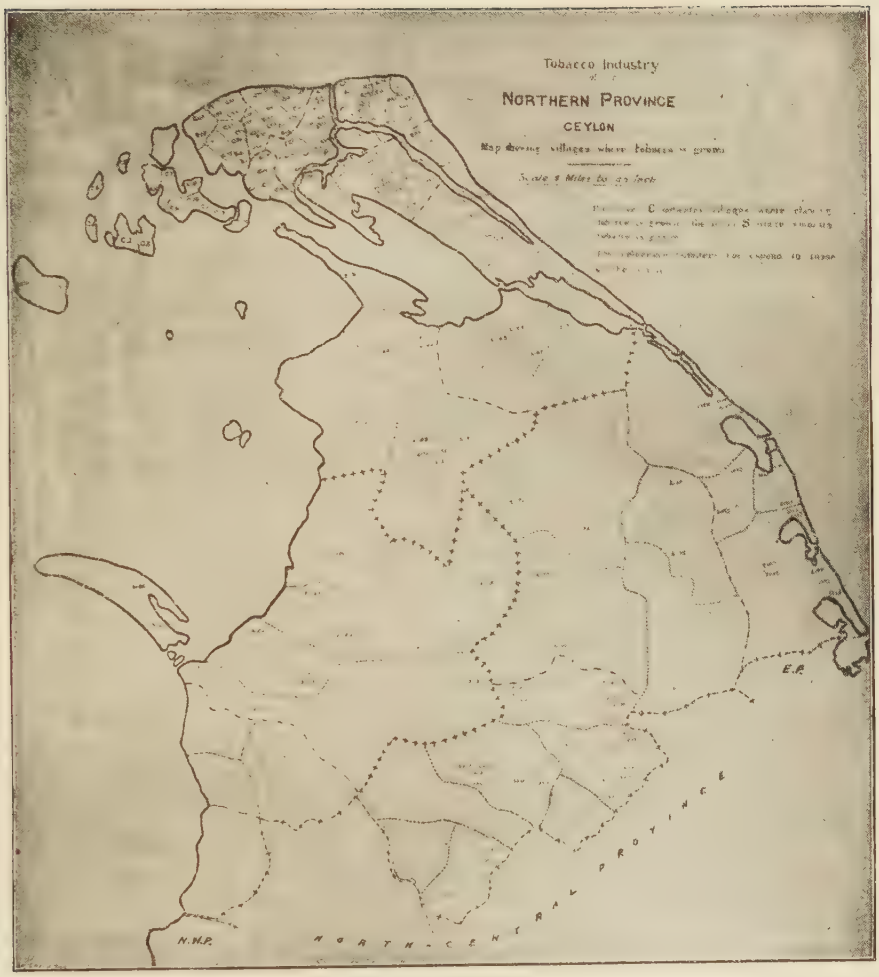
Reference No.	NAME OF VILLAGE.	Acreage under Tobacco.
	Brought forward	3,320
C.52	Vimankamam - - -	78
C.53	Kadduvan - - -	94
C.54	Mulavai - - -	60
C.55	Thaiyiddi - - -	75
C.56	Mayiliddi - -	145
C.57	Palali - - -	150
C.58	Vasavilan -	130
C.59	Valalai - - -	81
C.60	Pattaimeni - - -	55
C.61	Kathripay - - -	30
C.62	Navakkiri - - -	29
C.63	Achchuveli - - -	100
C.64	Puttur South - - -	30
C.65	Avarankal - - -	20
C.66	Puttur North - - -	15
C.67	Nirveli - - -	75
C.68	Siruppiddi - - -	102
C.69	Tondamanar - - -	2
C.70	Kerudavil - - -	10
C.71	Polikandy - - -	5
C.72	Valluveddi - - -	8
C.73	Tanakkarakkurichchi - - -	25
C.74	Imaiyanan - - -	14
C.75	Karanavay North - - -	25
C.76	Alvay North - - -	4
C.77	Point Pedro - - -	2
C.78	Alvay West - - -	7
C.79	Puloly West - - -	5
C.80	Puloly South - - -	9
C.81	Alvay South - - -	15
C.82	Tumpalai - - -	4
C.83	Karavetti North - - -	11
C.84	Karavetti East - - -	3
C.85	Karavetti West - - -	11
C.86	Tunnalai South - - -	5
C.87	Tunnalai North - -	10
C.88	Karanavay South - - -	15
C.89	Kaitadi - - -	20
C.90	Madduvil South - - -	18
C.91	Madduvil North - - -	5
C.92	Navatkuli - - -	20
C.93	Chavakachcheri South - - -	4
C.94	Sarasalai - - -	4
C.95	Kudattanai - -	8
C.96	Ampan - - -	9
C.97	Nakarkovil - - -	7
C.98	Chempiyanpattu - - -	15
C.99	Maruthankerny - - -	44
C.100	Puloli East - - -	1
C.101	Suravattai - - -	40
C.102	Ivinai - - -	250
		5,404

SMOKING TOBACCO.

Reference No.	NAME OF VILLAGE.	Acreage under Tobacco.
S. 100	Varani Iyattalai	5
S. 101	Mantuvil	40
S. 102	Karampaikkurichchi	2
S. 103	Tavalai Iyattalai	25
S. 104	Kudamian	20
S. 105	Navatkadu	30
S. 106	Misalai North	65
S. 107	Misalai South	2
S. 108	Kodikamam	20
S. 109	Sandanpokkaddi	3
S. 110	Allarai	25
S. 111	Ussen	18
S. 112	Kachchai	30
S. 113	Vellampokkaddi	2
S. 114	Ketpeli	15
S. 115	Palavi	15
S. 116	Mirusuvil	3
S. 117	Elutumadduval North	12
S. 118	Karampakam	22
S. 119	Vidattalpalai	20
S. 120	Elutumadduval South	5
S. 121	Mukamalai	4
S. 122	Vempodukerney	10
S. 123	Kilali	6
S. 124	Ittavil	1
S. 125	Thampakamam	21
S. 126	Sorampattu	12
S. 127	Periyapalai	8
S. 128	Puloppalai	28
S. 129	Tanmakkerney	7
S. 130	Urvanikanpattu	2
S. 131	Iyakkachchi	1
S. 132	Sankathavayal	4
S. 133	Kottandarkulam	3
S. 134	Mukavil	11
S. 135	Mullian	18
S. 136	Periyapachchilappali	3
S. 137	Pockaruppu	28
S 138	Veddukkadu	20
S. 139	Madduvilnadu	30
S. 140	Kollakurichchi	24
S. 141	Nallur, Punakary Division	10
S. 142	Alankery	8
S. 143	Kunchuparantan	1
S. 144	Nivil	3
S. 145	Murasumoddai	8
S. 146	Kandavalai	25
S. 147	Teniankulam	2
S. 148	Alankulam	2
S. 149	Vaddaiadaippu	2
S. 150	Tunukkai	5
S. 151	Kalvilan	10
S. 152	Pallavarayakaddu	54
S. 153	Ampakamam	8
S. 154	Karuppaddaimurippu	17
S. 155	Kachchilamadu	10
S. 156	Putukkudiyiruppu	5
S. 157	Valayanmadam	2
S. 158	Karayamullivaikkal	5
S. 159	Vellamullivaikkal	4
S. 160	Mullaitivu	30
S. 161	Chilavattai	12
		843

SMOKING TOBACCO. *(Continued.)*

Reference No.	NAME OF VILLAGE.	Acreage under Tobacco.
	Brought forward	843
S. 162	Tanniuttu	10
S. 163	Vattapalai	5
S. 164	Kanukkeni	5
S. 165	Mulliyavalai	10
S. 166	Alampil	3
S. 167	Chemmalai	2
S. 168	Kumulamunai	12
S. 169	Andankulam	1
S. 170	Kokkilai	6
S. 171	Karunaddukkeni	6
S. 172	Kokkuttoduvay	3
S. 173	Periyakulam	20
S. 174	Mamadu	35
S. 175	Unchalkaddi	8
S. 176	Paranthan	27
S. 177	Kamakarayankulam	10
S. 178	Palaiyavadi	15
S. 179	Kuttimulai	5
S. 180	Huppaikkadavai	59
S. 181	Vidattaltivu	20
S. 182	Attimoddai	7
S. 183	Alkaddiveli	35
S. 184	Karunkandal	5
S. 185	Nedunkandal	67
S. 186	Sirutoppu	½
S. 187	Kidaveddittoppu	5
S. 188	Periyanavatkulam	13
S. 189	Kalmoddai	1
S. 190	Tampanaikkulam	¼
S. 191	Chekkadippulavu	¼
S. 192	Panikkaniravi	½
S. 193	Kottandarnochchikkulam	¼
S 194	Palaimoddai	¼
S. 195	Panrikkeitakulam	½
S. 196	Vedamakilankulam	½
S. 197	Pakkuchchorinchan	¼
S. 198	Malikai	½
S. 199	Navatkulam	½
S. 200	Omantai	¼
S. 201	Ammivaitan	⅛
S. 202	Periyapuliyankulam	¼
S. 203	Nochchimoddai	¼
S. 204	Irampaikkulam	5
S. 205	Vavuniya	10
S. 206	Marutankulam	⅛
S. 207	Kalnaddinakulam	⅛
S. 208	Panrisurichchan	¼
S. 209	Rasentirankulam	¼
S. 210	Puvarasankulam	¼
S. 211	Tavasiyakulam	¼
S. 212	Nelukkulam	1
S. 213	Kidachchuri	¼
S. 214	Karuveppankulam	¼
S. 215	Nedunkaraichchenai	⅛
S. 216	Periyapuliyankulam	⅛
S. 217	Musalkutti	¼
S. 218	Chutumalai	6
S. 219	Nochchikkulam	¼
S. 220	Achcholu	54
S. 221	Paraiyankandal	2
S. 222	Delft West	15
S. 223	Delft East	1
		1,339½



Tobacco Industry

of the

NORTHERN PROVINCE

CEYLON

Map showing villages where tobacco is grown

RUBBER.

THE RUBBER INDUSTRY IN THE ISLAND OF JAVA.

By Mr. C. E. AKERS.

The rubber estates of Java are scattered over the Island from East to West, but much more numerous on the Southern Coast than on the North, due to the fact that the rainfall is greater and more regular in the South. The principal districts where plantations have been opened are near Buitenzorg and Krawang in the Province of Batavia ; Rangkasbidoeng and Menes in Bantam ; Tjandjoer to Bandoeng and Banjar in Preanger ; Langen, Tjipari and Kiliminger in Banjoemas ; Malang and Limburg in Pasoeran ; Djember, Kalisat and Banjoewani in Besoeki ; and at various points in the provinces of Kediri and Soerabaja. In nearly all districts where coffee plantations formerly existed rubber has been planted whenever conditions of climate and soil permitted. Experiments tried with Para rubber in the northen sections of the island between Batavia and Soerabaja have not proved successful owing to climatic reasons, and no plantations of importance are found in those districts.

AREA.

Official returns made in 1910 gave the area planted with Para rubber as 158,000 acres on 215 estates ; in addition there were under cultivation 1,086,126 *Ficus* trees, 687,748 *Castilloa* trees, and 356,253 *Ceara* trees. In 1911 some 50,000 acres were planted with Para rubber, and in 1912 the additional area planted or ready for planting is not less than from 22,000 to 25,000 acres. This estimated area for 1911 and 1912 is compiled from information supplied by estate agents and planters ; it is probably less than the actual amount and must be considered a very conservative figure. Summed up, the approximate area is :—

		Aggregate acres.		Increase acres.
1910	...	158,000	...	—
1911	...	208,000	...	50,000
1912	...	230,000	...	22,000

The extensions in 1911 and 1912 are directly due to the rubber boom of 1909-10, and took place principally in the eastern districts in the provinces of Besoeki, Pasoerean and Kediri.

TENURE OF LAND.

Land is held under long leases, seldom less than 75 years, issued by the Dutch Colonial authorities ; in the case of semi-independent Sultanates the grant is made by the Sultan and approved by the Resident Commissioner. The annual rental varies from 1s. 8d. to 5s. 10d. per annum per bouw of $1\frac{3}{4}$ acres. A large proportion of the public waste lands is now reserved for the purpose of native plantations of rice and other food-stuffs, and grants for

establishing rubber estates or other cultivations are difficult to obtain. It is, however, easy to buy from the owners of existing leases, the price varying from a few shillings to several pounds sterling per acre according to the conditions and situation of the property.

TAXATION.

In addition to the annual rental paid for leasehold land a tax of $\frac{3}{4}$ or 1 per cent. is levied on a valuation made once in every five years. While this cannot be considered a very heavy contribution it must be taken into account in all propositions for opening up rubber estates. No export duty is exacted on rubber shipments. The general revenue of the Colony is derived from 12 per cent. duties levied on all imported merchandise, a personal income tax of 6 per cent. and various municipal rates levied on house property and other real estate in the cities and towns.

WORKING EXPENSES OF A RUBBER ESTATE.

As is the case in all rubber growing countries, the larger proportion or the expenditure is for the payment of labour and the cost of management. The rate of wages varies so greatly in different districts, and even on different estates in the same district, that no hard and fast rule can be laid down for estate expenditure, but I have taken the average of a number of plantations in various localities and so obtained an approximate estimate of the necessary expenses. Another factor to be taken into account is that managers and assistants are paid small salaries with a bonus on profits. The custom in Java is to allow the manager 10 per cent. and the assistants $2\frac{1}{2}$ per cent. on the net profits, while the salary of the former seldom exceeds £500 and the latter £250 per annum on important properties with very extensive interests at stake. When an estate has reached the producing stage this bonus system appeals strongly to the individual manager, but a good many complaints are heard in connection with newly opened rubber plantations where four or five years must elapse before the concern becomes dividend paying. I think that much of the enthusiasm in Java for interplanting rubber with coffee and other products arises from the desire to earn profits at an early date.

The cost of tapping and collecting is very much higher in Java than elsewhere in the Orient for reasons explained later in this report.

MANAGEMENT OF RUBBER ESTATES IN JAVA.

The planting industry of Java has been established for so many years that experienced estate managers for tea, coffee, tobacco, sugar, cacao, coconuts, coca, and almost all branches of tropical agriculture are found in large numbers in the island. For rubber plantations, however, there is a great scarcity of experienced managers. In knowledge of tapping and general conditions in connection with Para rubber there is a marked lack of competent men. Of course this is only a passing phase, for with the expansion of the rubber area and the beginning of the production stage serious attention is being given to the matter, and both managers and assistants are being sent to the Malay Peninsula in considerable numbers to learn the methods employed and the general conduct of the business. In Java a fair number of Englishmen and some Frenchmen and Belgians are employed, but the great majority of managers and assistants are Dutchmen. The question of language is not an easy one for the newcomer, for to be thoroughly efficient he should

understand and talk fluently Dutch, Malay, Sudanese, Javanese, and in some districts Madoerese. In several districts I have visited Sudanese and Javanese only were spoken by the labouring classes, and Malay was practically unknown. In the planting districts of the extreme East such as Bangoewani and other parts of Besoeki the majority of the plantation hands are recruited from the island of Modoera and only understand their own dialect.

SUPPLY OF LABOURERS FOR THE RUBBER ESTATES.

With a population of some 35,000,000 natives it would seem that no difficulty should be experienced in Java with regard to the requirements of the sugar, tea, tobacco, coffee, rubber and cocoa plantations. Such however, is not the case, and with rubber estates particularly the number of coolies available is most inadequate in many districts. There is no doubt that the scarcity in the supply of labour for plantation purposes is due in great part to the large area under cultivation. The rice fields extend to over 3,000,000 acres, sugar some 600,000 acres, tobacco 200,000 acres, tea 250,000 acres, and a similar area under coffee and rubber combined; native foodstuffs and fruits to not less than 1,000,000 acres. Coconuts 200,000 acres, and probably not less than 500,000 acres altogether in other cultivations. This means that a combined demand exists for coolies to cultivate 6,000,000 acres, and in addition, there is an annual drain to Sumatra of some 50,000 labourers and to Malay of 10,000 for work on the rubber estates in those countries. It must also be remembered that the native methods of cultivating rice fields and gardens for fruit and foodstuffs is antiquated and extravagant, and labour saving machinery and modern implements practically unknown.

In the eastern districts a large proportion of the coolies employed are recruited from the island of Madoera close to the province of Soerabaja. This island is poor in agricultural resources, but has a large population of poverty-stricken inhabitants of whom a considerable proportion are willing to work on the estates, but make useful labourers after a period of a few months of regular rations has improved their physique.

There is no system of contract labour in Java. The coolies are free to work for any rate of wage they can obtain, and they take full advantage of this condition, leaving an estate whenever they feel inclined to do so without the smallest consideration for the inconvenience occasioned by such action. In order to check this inclination estate managers endeavour to form resident colonies of plantation coolies, and to those who remain permanently a higher wage is granted and many privileges allowed. On old established estates this resident labour force is a prominent feature, but on rubber plantations it is only a limited factor owing to the comparatively recent development of the industry, and its unpopularity compared to other cultivations. Another reason is that the climate and land best suited for growing Para rubber is situated generally in unhealthy districts and in somewhat inaccessible localities, where food supplies and other necessaries are expensive and not always easy to obtain.

RUBBER IN THE ORIENT AND ON THE AMAZON.

The Labour question is one of the most difficult problems confronting the rubber producers to-day in the Amazon Valley. At the present time the rubber industry gives employment to 100,000 men approximately as collectors, and, in addition, to another 10,000 or 15,000 working for a daily wage.

These men are natives of Amazonas or Para, or come from the more Southern States of Ceara, Rio Grande do Norte, Parahyba, or Maranhao. Every year a large number are recruited by agents in the above-named states for the Upper and Lower Amazonas. The expense of passage and maintenance from the date of leaving his home to his arrival at his destination is not far short of 300$000 for each individual, and fully that amount, if any advance of money is made, as indeed is the case generally. This sum of 300$000 is recoverable against the man's earnings, and he starts work with an indebtedness of that amount. It is seldom that he obtains a sufficient return from rubber collecting in his first year to discharge this initial indebtedness as well as the further amount incurred by his purchases from the store for his maintenance. In his second year he manages to pay off what he owes, but his account will show very little to his credit, although his share of the rubber collected may be not far short of 2,400$000 (say £130). As a matter of fact his living expenses should not exceed 1,000$000 if the goods supplied to him were valued at reasonable prices by the owner of the rubber property. It is this unsatisfactory condition of the labourers that makes the recruiting of fresh hands no easy matter, but the difficulty would disappear to a very great extent if the men were accorded fair treatment in regard to the prices charged for provisions and clothing.

THE DAILY WAGE RATE.

Where men are employed for other purposes than rubber collecting they are paid a daily wage varying from 3$000 (say 4s.) in the district of the lower Amazon, to as much as 6$000 and 7$000 in many districts of the Upper Amazon. Sometimes rations are given in addition to the wage paid, at others none are issued. Taken as a general rule it is safe to say that the average rate on the Upper Amazon is not less than 5$000 per day, with rations. On the Madeira-Mamore Railway the rate is 8$000 without rations.

THE TRUCK SYSTEM AND THE COST OF LIVING.

It matters not at all whether the labourer is working on shares with the proprietor, as in the case of rubber collecting, or is earning a daily wage, all are the victims of the truck system in vogue on the rubber properties. The men are compelled to supply their needs from the store, and exorbitant profits are charged on every article sold to them. Everything is purchased on credit, and the rubber collector or day-labourer, no matter what payments are made to him nominally, finds himself mulcted to such an extent that very little cash comes into his hands. In part the fault lies with the labourer, for he has taken from the stores many articles for which he had no real need, encouraged thereto by the fact that the way was made easy to him by the credit system.

The trend of the Brazilian character is towards extravagance rather than thrift, and full advantage is taken of this national trait. The excuse invariably put forward to me when discussing this subject with owners or administrators is that they in turn are overcharged for all supplies by their agents (aviadores) in Manaos and Para, and that the freight and other costs up the river make high prices necessary.

The first parts of this assertion is true, for these aviadores open large credits without security of any kind, and often demand 12 per cent. and even 20 per cent. interest on the amount agreed upon.

To cover bad debts they must make large profits on the merchandise supplied by them. The Brazilian property owner has the same weakness for extravagance as the labourer, and cares little what his indebtedness may be as long as the needs of the moment are met. Hence, he is unable to discharge his obligations and becomes a mere puppet in the hands of the aviadores. The business principles involved are unsound in every way, as is shown by the fact that the majority of both aviadores and proprietors are burthened with debt at the present time. There are signs that the existing system is nearing its end, and if lower prices for rubber bring about a crisis sufficiently acute to sweep away present methods and bring matters down to a cash basis the general condition of the country will be benefited most distinctly so far as the development of industrial enterprise is concerned. Smaller profits will be made and the wage rate will be reduced, but the profits will be real, no paper, and the wages will represent actual cash payments. In regard to the plea of high freights as an excuse for the excessive prices charged at the stores, there is little real foundation in fact. Recently all freight rates on the first necessities of life have been reduced by 40 per cent. and on other merchandise 15 per cent.

Moreover, the owners of properties can produce at their own doors nearly all foodstuffs required for the maintenance of the rubber collectors and labourers. With very little energy prolific crops of rice, manioca, maize, sweet potatoes, beans, tobacco and fruit can be obtained at costs far below those now paid for the imported article.

TRANSPORT.

The carriage of the rubber to the markets of Para or Manaos for sale and shipment to Europe and the United States is effected by the steamers of the Amazon River Steamship Company or those belonging to private individuals, in the latter case these often being the proprietors of rubber estates. For such a valuable cargo as rubber the charges are not excessive. The rate varies according to distance, and so far as it is possible to strike an average over the Lower and Upper Amazon the cost distributed over the annual production does not exceed one half-penny per pound. This sum might be reduced considerably if more care was taken in the preparation of the rubber and if it was dried out to a greater extent before despatch for sale. At present the *pelles* or balls of rubber contain on an average 20 per cent. of moisture when sent away from the estates.

CLASSIFICATION OF RUBBER AT MANAOS AND PARA.

On arrival at the port of shipment the rubber is classified by the brokers previous to sale. This process consists of cutting open all balls, no matter whether they weigh 10 lbs. or 100 lbs. The inside contents are then classified as "extra fine" (sertao), "fine" (fina), "medium fine" (entre fina), "medium" (fraca), and coarse, according as the quality varies in the opinion of the expert superintending the operation. The scrap (sernamby) which arrives in a wet and half rotten condition is classified as coarse. This classification is necessary not only for selling purposes, but also for assessment of the duties to be paid to the State before the shipment is permitted.

METHOD OF SHIPMENT.

After classification and valuation for the payment of duties the rubber is boxed in cases averaging approximately either 400 lbs. weight in the smaller boxes or 800 lbs. in the larger cases.

Freight to Europe or the United States is by measurement at the rate of 65s. and 60s. per 40 cubic feet from Manaos and Para respectively, and this works out at about double that charge per ton weight.

Owing to the shape of the rubber balls a great deal of space is lost in packing. A certain amount of rubber from Bolivia passes through Para in transit and is shipped in bulk without cases.

SOUTH INDIAN RUBBER PLANTING.

The growing importance of the rubber industry in South India can well be understood from the fact that to-day there are no less than 35,000 acres of land under rubber in the Malabar district alone. It is said that an enterprising gentleman, who is already in the field, is arranging with a native landowner for the purchase of a whole hill in south Malabar, measuring several thousands of acres, to be mainly devoted to rubber. It is also reported that a company is being formed to take over and work a property, growing tea, rubber, coffee, and cardamoms.

A correspondent of "Capital" writing from Southern India says:--

"It gives me great pleasure to tell you that the rubber we grow over here is as good and is as much per acre, age for age, as say in the neighbouring island of Ceylon, while the prices we have realised compare very favourably with those fetched by any other rubber in the market. All this is very gratifying no doubt. But if we are to do better, and if the rubber industry is to grow in our part of India, the iniquitously high rate of freight on rubber to England must be reduced. As it is, it weighs down as a great handicap upon our young prodigal, and feeling among planters runs very high on the subject. I am told that the West Coast firms concerned have made the necessary representations, and I fully expect that some substantial reduction will be made, and an encouraging fillip given us shortly."—THE FINANCIAL NEWS.

SOILS SUITABLE FOR RUBBER CULTIVATION.

The following article is reproduced from *Der Tropenpflanzer* :—

The writer, Director of the Agricultural Institute of the University of Halle, has analysed samples of the soils which were most suitable for growing rubber and which had been sent from Brazil ("Seringal," Sao Francisco near Mt. Alegro), from Bolivia ("Seringal," Philadelphia, near Cobijia) from the higher basin of the Amazon and from German East Africa.

The following table gives some of the detailed results obtained: —

Type of soil.	Source.	Nitrogen.	Lime.	Phos: Acid.	Total potash.
		per cent.	per cent	per cent.	per cent.
Fine loam - -	Seringal, Sao Francisco, Brazil	0.085	0.050	0.076	0.233
do - -	Seringal Philadelphia, Bolivia. - -	0.124-0.147	traces	0.026-0.038	0.272-0.442
Sandy clay - -	Tanga - -	0.077-0.225	0.180-0.360	0.039-0.062	0.027-0.033
do - -	East Usambara { Longusa -	0. -0.058	traces 0.026	0.012-0.055	0.134-0.325
Typical red soil - -	East Usambara { Ngambo 11 -	0.11 -0 39	0.013-0.080	0.127-0.229	0.399-0.471
Red humic soil - -	East Usambara { Magunga -	0.11 -0.26	0.09 -0.37	0.28 -0.35	0.32 -0.46
Brown loam - -	Morogoro II. - -	0.09 -0.16	0.18 -0.253	0.111-0.174	0.616-0.871
Dark red soil - -	do IV. - -	0.12 -0.15	0.073-0.127	0.055-0.149	0.34 -0.48
Laterite - -	do V. - -	0.038-0.135	0.005-0.080	0.03 -0.068	0.112-0.505
Medium red soil - -	do VI. - -	0.105-0.165	0.033-0.09	0.08 -0.12	0.341-0.533

In comparing the fertility of the soils of South America with those of German East Africa, it is necessary not to lose sight of the fact that in the former country the annual rainfall is 120 inches while in the latter it only amounts to 80 in. near Tanga and in East Usambara and 48 in. in Morogoro. Thus, in the soils of South America the nutritive substances are more transportable and more easily assimilated than in the soils of German East Africa, which would only be as fertile as the former if they contained about 33 per cent. more of nutritive substances. The species of rubber trees cultivated are different in the two cases: *Hevea brasiliensis*, which requires an abundant rainfall, is cultivated in South America, and *Manihot glaziovii*, which fares best in a dry climate, is grown in German East Africa. But the products obtained are chemically the same, whence it is believed that both species require the same, or nearly the same soil. This idea seems to be confirmed by the analytic results of the writer. He considers himself justified in deducting the following conclusions regarding the selection of a good soil for rubber trees:

1. Such a soil should be fine, of medium coherence, rather loose than heavy, and deep. The combined fineness and depth of the soil bring about a dampness which appears to be indispensable to the formation of latex. Loams or clay loams with from 95 to 100 per cent. of fine particles are the soils to be preferred, those rich in laterite, or iron compounds, are apt to be deceptive, while compact clays, and especially soils with exteme characters should be rejected.

2. With regard to the nutritive substances:

(a) It is not necessary that the nitrogen content should be high; a large percentage of humus is perhaps downright injurious ; O. 1 per cent. nitrogen is sufficient, especially in districts with a large rainfall.

(b) As for lime and magnesia, rubber trees only need very limited amounts of these substances. It is not yet known whether a high percentage of lime and magnesia hinders latex formation, or if the trees suffer in calcareous soils.

(c) The rubber tree appears to have no special requirements as regards content in phosphoric acid.

(c) It seems, on the other hand, that a large amount of potash in the soil promotes growth and the formation of latex ; it is therefore advisable to use fertilizers containing potassic salts.

RUBBER IN THE CONGO.

By MR. CONSUL LAMONT.

(EXTRACTED FROM CONSULAR REPORT.)

The exports of Rubber showed a heavy decrease in value in 1911 compared with the preceding year, the figures being £1,376,108 in 1911 and £2,040,624 in 1910. The amount of rubber exported in 1911 was only 17 tons short of that exported in 1910. Rubber is purchased at prices ranging from 1fr to 4fr per Kilo, and in the Stanleyville district at 1fr 50c to 2fr Congo forest rubber secures in European markets prices at present averaging 3s. 8d. per lb., plantation rubber (Crepe I) 4s. 2d. per lb.

The experimental work carried out in the direction of the plantation and maintenance of rubber vines has not met with much success from a practical point of view. The plantation of rubber vines has been in progress since 1900, the State having at the present moment probably over 12,000,000 growing in the various plantations, but no pecuniary benefit therefrom has been secured. The cost of planting and maintenance has not been met by the produce got, so that in the Congo as well as in the other equatorial colonies rubber vine culture may be considered as outside the sphere of economic development. The growth of vines is always very slow, and not in less than 10 years after planting can results be looked for. Experiment has shown that 64 lbs. of rubber to an acre growing 800 trees may be expected after 10 years' growth.

The *Ireh* or *Funtumia* was the first species tried, and great hopes were entertained as to its ultimate success ; many plantations of it were established in the Congo by the State, until there are now over 3,500,000 trees. At that time the *Hevea brasiliensis* had not received that attention which it does to-day. Experiments were made with it but failed to give encouraging results, owing to incorrect methods of tapping. The plantations of *Hevea* were therefore abandoned, and only the remarkable results given by the Malay States plantations of this rubber plant have re-awakened the interest of Congo planters to its cultivation. The State-cultivated area has been increased from 2,920 acres in 1910 to 4,110 acres in 1911, and 780 acres of this were planted with *Hevea brasiliensis*, the rest with *Funtumia* and *Manihot*.

FUNTUMIA.

It is estimated that 3,500,000 trees are now growing, but many plantations have been overwhelmed by weeds, notably the *Imperata cylindrica* or the *Alang-Alang* of the Congo, a fatal growth as well to rubber in the Malay States. Of 220 plantations made by the State only 50 are now really supervised. The results produced have been extremely variable, and in certain regions, such as the Mayumbe, the tree does not seem to flourish well, some trees of seven years' growth there not even yet being fit for tapping. At Lukolela, Moyen Congo, as also in the Equateur district, better results have been obtained from the *Funtumia*. All the experiments with it throughout show that the *Funtumia* cannot be profitably tapped under the best conditions of cultivation before eight to ten years' growth. It grows best in regions where the rainfall does not exceed 45 to 55 inches, and on soil of a mixture of sand and clay. Certain insects, such as the *Glyphodes ocellata* and *Glyphodes sericia*, damage the *Funtumia* in the Congo to some extent. The coagulation of *Funtumia* latex appears to be more difficult than that of *Hevea*, and the use of acids does not give as a rule satisfactory results. In the Congo coagulation by precipitation in boiling water is the system which has given the best results. No doubt is now, however, entertained that the *Funtumia*, although indigenous to the Congo, ranks far behind its foreign prototypes—the *Hevea brasiliensis* and *Manihot glaziovii*—as a producer. The method of cultivation of *Funtumia* now receiving powerful advocacy is to plant the trees at first very close—say 8,000 to the acre—and eliminate the weaker ones gradually until at the end of 40 years only 400 or 500 of the best rubber trees are left growing and yielding.

COST OF CULTIVATION.

It costs the State £8 to £9 per acre to clear and plant with rubber, but private individuals will pay considerably more. A new system of tapping by means of a series of small borers set in a circle has been devised by a British expert now in the Congo, Dr. Christy, and is expected to yield results in tapping about double those secured by the vertical incision system. The average results obtained by the latter on the State plantations of *Funtumia* shows 31 lbs. of rubber to the acre at one tapping of seven-year trees, while the Christy system can give as much as 97 lbs. to the acre.

MANIHOT GLAZIOVII.

The regions most suited to the *Manihot* appear to be the Bas Congo and Uele. It has almost disappeared in the too humid regions of the Equateur, Aruwimi, Bangala, Lac Leopold II and from the centre of the Stanleyville district, all of which lie in the great equatorial forest and are subject to heavy rainfall. This hastens growth during the first three or four years, after which the trees usually fall victims to cryptogamic disease. The number of *Manihot* trees on the State plantations in 1908 was 205,081 ; in 1910 it had fallen to 125,032. The production varies very much in different districts. Although the *Manihot* cannot be compared with the *Hevea* as a rubber producer it may be found more suitable than either the latter or *Funtumia* in certain districts.

HEVEA BRASILIENSIS.

The culture of this South American rubber plant has entered on a new phase in the Congo. Experimental plantations of it since 1904 have shown the unsuitability of certain regions owing to lack of sufficient and regular rainfall. In the Equateur, Bangala and north-west part of Stanleyville district the conditions seem more favourable in respect of rainfall, and several large plantations are in process of being laid out. Large quantities of *Hevea* seed have been imported, and during 1911 over 350,000 seeds have been harvested in the Congo. Experimental tapping on 10 years old *Heveas* in the Mayumbe has given ⅔ lb. per tree in 30 collections ; at Coquilhatville some 10 years old *Heveas* have yielded in 40 tappings 3·3 lbs. The quality of the *Hevea* rubber is very good and fetches a high price in the market.

The *Ficus elastica* grows throughout the colony, as well as the *Ficus vogelii*, but neither is regarded as of much economic importance.—LONDON COMMERCIAL RECORD.

HARD CURE PROCESS.

To the Editor of the "TROPICAL AGRICULTURIST."

DEAR SIR,

In answer to various enquiries that have reached me will you kindly permit me to say that there is (and can be) no general rule as to proportion of Rubber in *latex*, in that it is dependent on its density: i.e., owing to conditional state of weather—wet or dry —the age, condition of the trees, etc.

With "hard-cure" the whole of the constituents of the *latex* are taken up by the success film-formation, except only such water as it may contain —much during heavy rains—little during dry weather.

It should be remembered that the essential oils conveyed in and by the impingement of the hot smoke-jet renders the forming films incompatible with retention of water.

Yours etc.,
H. A. WICKHAM

30th March, 1913.

RUBBER IN HAWAII.

STEADILY BECOMING A MORE IMPORTANT ITEM OF PRODUCTION.

In a report by the Acting British Consul at Honolulu on the trade of Hawaii in the year ended June 30th, 1912, which will shortly be issued, it is stated that rubber is steadily becoming a more important item of Hawaii's products. On the Island of Maui many trees have been planted, and these are now being tapped in large numbers. Steady efforts are being made to improve the methods of preparation in order to increase the marketable value.

During 1912, 35,000 were tapped, and altogether some 8,000 lb. of rubber were expected to be produced, most of which will be exported. For 1913 an output of 20,000 lb. is anticipated. Attention has been directed to an indigenous rubber tree (Euphorbia lorifolia), which grows in several localities, one place in particular on island of Hawaii having 6,000 acres, averaging 75 trees to the acre, whose product is 14 to 17 per cent. of rubber and 60 per cent. of resin (chicle). It is reported that the latex contains 42 per cent. of solid material, and that one man can collect 16 to 30 lb. of crude product per day.—Financier, April 1st.

SIR HENRY BLAKE ON PLANTATION STANDARD RUBBER.

A SUGGESTION TO THE C.P.A.

Sir Henry Blake, writing from Youghal, Co., Cork, to Mr. F. Crosbie Roles says:—" I have read your report on the Ceylon participation in the International Exposition with great interest. It is clear that the Ceylon planters must aim at uniformity, and, of course, the first step must be taken by a careful examination by chemists of the latex taken from trees of various ages, and of the same age, but grown under different conditions. If all latex is equal, then it is simply a matter of securing uniformity of manipulation. If they vary, it is for the chemist to tell us how the variation is to be brought into line for purposes of the market. Until this result is arrived at, 'Hard Para,' grown under identical conditions and produced from old trees, will hold the first place as far as it goes. So with 'Guayule.' Manufactures have no differences to contend with as the shrub grows on dry sandy soil. The importance of this question entirely overshadows the disadvantages found in the New York market from the re-packing in London. And I hope that the matter will be taken up by the Planters' Association in Ceylon. Your observation on the benefit of sending corrugated instead of plain sheets is also valuable. I congratulate you on the report, which tells us what we want to know. I hope that we may have a solution of the uniformity problem before the Rubber Exhibition to be held in London next year.—Ceylon Observer.

RUBBER SEED AS A BYE-PRODUCT.

Mr. William Wicherley sends us the following notes on Para Rubber Seed and its utilization:—

It is over two years since I began seriously to consider the possibilities of utilizing Para Rubber seed both for its oil and its residue kernel as cattle food. After many tentative experiments which all proved the highly valuable qualities of the seed under analysis I put down a plant at Grand Pass, Colombo, with a view to treating this bye-product on a commercial basis.

Planters were at first rather shy of our proposals but eventually we were able to obtain all the seed our stores would hold at a price which left the planter a net profit of about £1 per ton which was evidently highly satisfactory since we never received a single complaint from any of our customers on this account. The initial work of organizing supplies was both tedious and costly, and it was not until the end of October, 1912 that I was able to congratulate myself on the fact that the seed in stock was more than sufficient for my work. I had the previous year and early in 1912 personally canvassed the Hull Oil trade, submitting samples of Ceylon seed only. I also obtained seed from Malaya but for some reason or other they deteriorated in an alarming manner, so I gave them up as experimental samples. The seed was submitted in both the undecorticated and the decorticated state, being crushed separately and carefully analysed to determine the respective value of its constituent parts.

Among other firms to whom samples were submitted were the well-known British Oil & Cake Mills of Hull and Great St Helens.

I received their report, signed by the General Manager on 1st. January this year and the following are among many of the interesting conclusions arrived at by them respecting my consignments.

" I have much pleasure to report to you that we have made a very careful examination of the samples of rubber seed which you sent us. The seed that came over in the shell would not be serviceable for cattle food as the shell is dangerous to animals. The seed should therefore be decorticated. I have pleasure to attach herewith three analysis. You will note our chemist reports that he finds your seed contains approximately 4 kernel and 53 shell. I can now further advise you of our general experience in this connection. The cake is rich in feeding value. With regard to the soil, we think the place this can take amongst other oils has now been fairly well established. It comes under the Drying Oil class and appears to be one of the best natural substitutes for Linseed Oil that has yet been found. It seems equally serviceable for the soap maker. We do not suppose there can be any difficulty whatever in finding a ready market for the Oil in considerable quantity.

According to our crushing experience the Decorticated Kernels on the basis of to-day, market value would be worth to us about £9. 10. 0. per ton delivered to any U. K. Port. On this calculation the seed in the shell would be worth £3. 15. 0 per ton. As to quantity a considerable business could be dealt with at once, and there would be no difficulty in disposing fairly rapidly of 1,000 tons.—J. W. PEARSON, Managing Director."

I enclose the general analysis referred to in the report and these are all borne out by analysis taken locally in Colombo quite recently.

The question of decortication bothered me considerably. I obtained three of the best decorticating machines on the market, but the almost equal preparations of shell and kernel presents at present an insurmountable obstacle to a rapid and effective separation of the two parts. The kernels must be immediately dried after decortication otherwise they deteriorate rapidly and every insect known and unknown seems to lay claim to it as a

rare delicacy. They will not, however, attack the seed when dried. The only enemies at this stage are the rats and squirrels who are inordinately fond of them.

Hereunder are the analysis above referred to :

Copy of analysis of Decorticated (sundried) Rubber Seeds.

Oil	50.36	per cent.
Moisture	7.20	,,
Albuminoids	17.06	,,
Carbohydrates	18.72	,,
Ash	2.66	,,
	100.00	
Sands	0.18	

Copy of analysis of Undecorticated Rubber Seed Husk (or shell)

Oil	0.96	per cent.
Moisture	12.14	,,
Albuminoids	1.75	,,
Carbohydrates	11.15	,,
Wood Fibre	73.60	,,
Ash	0.40	,,
	100.00	
Sands	0.18	

I think the foregoing proves conclusively that planters possess a valuable bye-product in the waste rubber seed that is annually allowed to rot on the ground. Most of the seed we purchased was collected by boys. I understand that a fair profit was obtainable by the whole of the planters who supplied us with seed. At any rate we had no complaints on that score. Several thousands of tons were offered in from Malay States, but the price was prohibitive, and I am afraid that just at present there is not much chance of securing supplies outside the F. M. S. and Ceylon although the question is undoubtedly worth the serious attention of Para Rubber Planters wherever the Hevea brasiliensis may be found.

POULTRY.

EGG-LAYING COMPETITIONS AT THE HAWKESBURY AGRICULTURAL COLLEGE.

These competitions took place for ten years and have brought to light many interesting facts. In the tenth series, the laying hens were supplied with animal food in conjunction with their ordinary rations ; this diet was of some advantage in inducing egg-laying, but it is a question whether the increase in the number of eggs obtained covered the extra expenses involved.

In the autumn, the pullets which received no meat laid as well as those which were given this addition to their rations ; but in the spring and summer the meat-fed fowls proved the best layers. In appearance and bodily condition there was no appreciable difference between the two lots of pullets ; but it is noteworthy, however, that while there were no broodies among the White Leghorns, which received no meat, there were five out of thirty in the corresponding meat-fed pens. Broodies were less prevalent than in previous competitions, showing that greater egg-producing development lessens the tendency to broodiness.

The whole series has been carried out on essentially practical lines. The morning meal consisted of bran and pollard mash ; twice a week the mash was scalded with liver soup and the minced liver and soup mixed with the bran and pollard. This is not only valuable for its protein content but is a tonic and appetiser. In the afternoon, grain was fed; wheat predominating, but maize was fed more frequently in cold weather ; it was also given once a week as a change. Green food was fed in the shape of rape and lucerne.

In the case of good layers of Leghorn breed it may be advantageous to keep them into the third year but any way they should be sold on the eve of moulting in their third season. The third year Leghorn hens showed a wonderful record namely a total of 1,016 eggs and this breed proved itself to be the best for egg production. The average number of eggs laid annually by one hen rose from 130 at the commencement of the experiments to 184 at the close of the ten years. During the three laying periods of a three-year-old fowl, the number of eggs produced gradually decreases.

Meat feeding was tried in the case of the ducks and with good results.

The health of the birds was extremely good, showing a lower mortality than the average of the ten tests ; the general average being 6 per cent. No case of infectious or contagious disease occurred.—FARMERS' BULLETIN No. 57

COTTON.

AMERICAN UPLAND AT HAMBANTOTA.

ENCOURAGING RESULTS.

Below we print in full the report of the cultivation of a small trial plot of Allen's long staple cotton at Ambalantota. The yield works out at 1,043 lbs. first and second grade per acre, the largest yield yet obtained in Ceylon, as far as we are aware. We understand that as a result of this trial some 200 acres of land are likely to be planted in Cotton next season by people in the Hambantota District.

The following correspondence will prove of interest :

No. 1903.
Date : 7th May, 1913.

From the ASSISTANT GOVERNMENT AGENT, Hambantota,
To the SECRETARY, Ceylon Agricultural Society, Colombo.

Subject :—**AMBALANTOTA COTTON EXPERIMENT.**

Sir,

I have the honour to annex copies of reports by the Mudaliyar, Magam Pattu and the Agricultural Instructor, Mr. Jayasuriya, on the recent cotton experiment at Hambantota.

2. The result has been most successful and reflects great credit on all concerned. The Mudaliyar is keenly interested in promoting cotton cultivation in his Pattu and I shall do my best to encourage this form of agriculture in the district.

I am, Sir,
Your obedient Servant,
E. T. MILLINGTON,
Assistant Government Agent.

AMBALANTOTA COTTON EXPERIMENT.

Sir,

I have the honour to report that I have now completed the first picking of cotton of the above garden which is in extent 1 acre, 2 roods and 34 perches, and that I have gathered up to date 1,558 lbs. first grade, 220 lbs. second grade and 48 lbs. third grade cotton.

2. Messrs. Freudenberg & Co., Colombo, Agents for the British Cotton Growing Association, to whom I forwarded a sample of first grade seed cotton for valuation, reported as follows :—"Very clean, silky appearance, fine, long and strong staple ($1\frac{1}{4}$ to $1\frac{1}{2}$ in). We can pay for the cotton Rs. 14/- per cwt., delivered at our mills and shall be glad to receive the consignment."

3. As the preliminary work had to be started rather late in the season, and owing to the heavy rain prevailing at the time, and to the scarcity of coolies, an unusual amount had to be spent getting the land prepared in time for the season, but the ordinary cost of working an acre should not exceed the following items :—

Clearing an acre	...	Rs. 15.00
Cost of seed	...	,, ·50
Planting	...	,, 5·00
Weeding	...	,, 10·00
Picking and grading	...	,, 10·00
Freight to Colombo and other charges		,, 5·50
		Rs. 48·00

4. Calculating on those items it shows a nett profit of about Rs. 70/- from an acre within eight months, which I consider is a very good return when compared to the chena cultivation carried on in the district.

Submitted,

N. M. JAYASURIYA,

Agricultural Instructor, S. P.

From the MUDALIYAR, Magam Pattu,

To the ASSISTANT GOVERNMENT AGENT, Hambantota.

Sir,

Under the auspices of the Ceylon Agricultural Society a plot of land, about $1\frac{3}{4}$ acres in extent, was cultivated about $\frac{1}{8}$ of a mile from the Gansabhawa and the market place at Ambalantota.

The land was grown with Allen's Long Staple cotton under the supervision of Mr. N. M. Jayasuriya, Agricultural Instructor, who deserves all the credit for the excellent results. The headmen assisted him in securing labour which at the start was rather difficult to procure.

The seeds were planted 20 inches apart in rows of 3 feet apart. The planting was completed by the end of October ; the bolls burst early in March, when picking commenced.

The average number of bolls was 42. The yield amounted to 1,826 lbs., of which 1,588 lbs. were of the 1st grade.

The experiment was a thorough success, and has attracted the attention of the villagers who have already applied for Crown land for cotton cultivation during the ensuing *Maha*.

Some difficulty was experienced at the outset owing to the unusual rains that prevailed when the clearing of land was made, resulting in an

enhanced expenditure for removing the scrub jungle instead of burning it.

The average cost and profit per acre is as follows :—

		Rs. Cts.	Rs. Cts.
INCOME.			
907 lbs. @ 12 cents	...	Rs. 108 84	
136 lbs. @ 10 cents	...	13 60	122 44
COST.			
Cost of seed	...	50	
Clearing per acre	...	15 00	
Planting	...	5 00	
Weeding	...	10 00	
Picking	...	8 00	
Grading	...	2 00	
Freight & other charges	...	7 50	48 00
		Net profit	74 44

Hambantota, 28th April, 1913.

H. F. AMARASEKARA
Mudaliyar, Magam Pattu.

TEA.

STORY OF THE CEYLON TEA INDUSTRY.

Dr. Chandler in concluding his series of four lectures delivered at the London School of Economics and Political Science, Clare Market, Kingsway, W.C., on "The Economics of the Tea Trade," remarked that it was almost true to say that the Ceylon industry was but an offshoot of the Indian; but, as was often the case, the offshoot had become a serious competitor with the parent stock, and, in fact, Ceylon was the only important rival of India, though an eye must always be kept on the Dutch East Indies. The Ceylon industry went through a long apprenticeship of experiment, failures, and ultimate success; but, profiting by the lessons learnt by India, "went in for tea" and established what was at that time a record in planting enterprise. The story of the Ceylon tea industry presented both its pathetic and heroic side. Tea arose on the ruins of coffee, a collapse brought about by a dreaded coffee leaf disease, which in a comparatively short period practically extinguished a flourishing industry worth at the best of its development and that within a few years of its extinction, something like £3,000,000 per annum. Many planters were ruined, others tried to retrieve their fortunes by planting up cocoa, etc., while others, with newcomers, remembering the success of India, planted tea and with remarkable results. The climate of Ceylon proved to be pre-eminently suited to the plant, and in time a satisfactory labour supply was obtained from Southern India. The result was that the exports of tea had grown from 2,000 lbs. in 1877 to 192,000,000 lbs. in 1912. The markets of course, were Russia and America chiefly, and although Ceylon did not make so much green tea in 1912 as in 1911, the general state of affairs was very satisfactory since, and the exports for 1911 were double those of 1910, and nearly twenty times those of 1904.:—THE GROCERS' JOURNAL.

TEA: AN ABYSSINIAN SUBSTITUTE.

At the opening meeting of the session in Edinburgh of the Pharmaceutical Society of Great Britian the inaugural address was given by Professor Ralph Stockman, who took as his subject "Stimulant Narcotics," with an account of *Catha edulis*. The Swedish botanist, Forskal, who died in Arabia in 1768, was the first to draw the attention of Europeans to the leaves of *Catha edulis* as a stimulant. The plant grows wild in Abyssinia and the neighbouring mountainous districts along the coast of East Africa. Its use is said to be older than that of coffee. The leaves have a pleasant aromatic odour, and an infusion made from them has a markedly sweet and astringent taste, somewhat resembling liquorice. In the social life of the Arabians and Abyssinians the leaves play much the same part as tea, coffee, cocoa, and other well-known

stimulant narcotics do among other peoples. Professor Stockman had obtained three alkaloids in a state of purity, to which he gave the names of catchine, cathidine and cathinine. The first had an action something like a combination of morphine and caffein. Cathinine had not the same drowsy or depressing effect on the brain, but acted more as a stimulant to the spinal cord. Cathidine acted as a muscle poison and a slight stimulant to the nervous system. Broadly speaking, the action of the leaves was essentially comparable to that of other vegetable products which are used by mankind as stimulant narcotics.—Grocers' Review.

PARAGUAYAN TEA.

On the subject of Brazilian or Paraguayan tea, about which there has been much written of late, Sir W. Haggard, His Majesty's Minister in Brazil, in his report on his visit, in October, 1912, to the southern part of Brazil, refers to a probable revival of the cultivation of this product. He says : " In former days every family in the State grew its own tea (herva matte), and it was also exported in large quantities to Sao Paulo. Now its cultivation is restricted to the neighbourhood of Curityba, Ponta Grossa, and Castro, and yet local experts all agree that there could be no produce more easily cultivated and more suitable to the soil of Parana. The bushes on which grow the shiny, deep green leaves with which, when dried to powder, an infusion like tea is made, look like large box trees, growing wild with great regularity under the forest trees. When cleared of undergrowth it looks like a plantation. Generally they are very handsome, varying in size from six feet to the height of timber trees. The infusion takes the place of tea and coffee amongst millions of people in Argentine and South Brazil, and I have heard, continues the Minister, to a great extent in the west of South America. Its taste is not pleasant to a beginner, beyond which stage I have never gone, but people accustomed to it will drink no other infusion, and it is said to have a very tonic effect on the nerves. The Argentine guacho drinks enormous quantities of it out of a bowl through a metal pipe, and declares that it is meat and drink to him, on a journey, which does not prevent his devouring quantities of tough, half-cooked beef. I hear that there is a propaganda for advertising it being made in the United States and in Europe, and, as far as we could judge, there would seem enough of it to supply the whole world. Roughly, about £2,000,000 worth is exported yearly from the port of Paranagua."—H. &. C. Mail, April 11.

CO-OPERATIVE CREDIT MOVEMENT.

CO-OPERATIVE CONFERENCE OF THE UNITED PROVINCES.

The following is an extract from the speech of Sir James Meston published in the *Indian Agriculturist* which was delivered before the fifth Co-operative Conference of United Provinces:—

Co-operative credit is, in my view, not only a great financial and economic, but also a great social force. We hear often complaints of the decay of the old village community in Northern India, one of the most ancient and durable sociological phenomena in the world. Modern influences have at last begun to sap it, and many efforts have been suggested for restoring it—the revival of the village panchayat, the bolstering up of the lumberdar, the encouragement of the mukhya, and so on. We have seen disappointing results from most of these attempts, but in the co-operative movement we have a new cementing power. It unites the village community or at least all the best elements in it upon the old and only permanent basis of common interest and mutual aid. But your operations are not confined to the village communities. Your Urban Societies far exceed in number those of any other province in India, and you are thus bringing into our towns the same powerful agency for soothing dissension and for turning men's minds to material progress which is the great solvent of all less important rivalries.

Continuing further, His Honour said:— The mainspring of your movement, Gentlemen, is the prevention of waste in India, unfortunately you find waste everywhere. Mental energy is wasted on useless squabbles when it is needed for patriotic advancement; capital is wasted in hoards or in unproductive uses when it is urgently wanted for arousing the slumbering industrial power of India; agricultural wealth is wasted, because the savings of the people do not go back into the land; the natural frugality of the rural population is wasted because there is no means of storing its results, and thrift is thus discouraged. The whole social system contains among much that is noble and praiseworthy that vicious circle of waste which handicaps progress and leads to much needless poverty. It is to eradicate this canker from the body politic that is your hope, and I have every confidence that the co-operative movement will be in time one of our most effective remedies. You look forward to the time when the cultivator, freed from crushing debt, will be able to conserve the fruits of his labour and thus to be prepared against the vicissitudes of the seasons. The mass of agricultural wealth will simultaneously be strengthened, as the rural population will be able to put more money into the land in the shape of good seed and better fertilizers. It follows that

the professional money lender instead of being, as I am afraid he sometimes is, your enemy, will in time become your friend ; for he will get good security and a rapid turn-over at moderate interest of the risk he now runs and the extortionate terms which he often imposes. His capital, in place of being sunk in poverty which he is frequently unwilling to acquire and unable to manage, will be set free for investment in industrial enterprise, or in your central banks. The hoards of the richer landholders, instead of lying infructuous, similarly be brought into action and thus the surplus resource of the land, and of your indigenous trades and crafts will, in time, be available to meet the crying financial needs of India. From national industries, for more railway and canals, more looms and greater comfort, healthier homes. All this may be an ideal of the distant future, but your labours are bringing it near every step. That you take care and judgment in fostering the genuine co-operative spirit is a step towards bringing India into line with the great producing countries of the world, and as labour is sweetened by the hope of reward, I wish to assure you that the work of those who genuinely throw themselves into this movement will not be overlooked or forgotten. It will have its ultimate reward, I hope, in the grateful memory of a prosperous people, but in the meantime the Government of this province, so long as I am associated with it, will watch the disinterested toilers in this field and will regard their services with the same favour as it regards the work of all good citizens in the tasks of Municipal or District Board activity, of education or sanitation, of charity or loyalty.

GENERAL.

PADDY CULTIVATION IN CEYLON DURING THE XIX CENTURY.

By E. ELLIOTT.

(Continued)

As is well known, the village tanks in the North-Western, North-Central and the mainland of the Northern Province, have alone been the means of preserving these districts from depopulation, being the only source of water supply; and when their upkeep was neglected, after the abolition of Rajakaria, the consequences were most disastrous. Thus in the Wanni of the Northern Province, Mr. Dyke records the male adult population decreased one-seventh between 1839 and 1862, while between 1871 and 1891 there was a decrease of over 5% in the Mullaitivu district, and the total increase in the 20 years in the whole Wanni, was only 1% which was chiefly due to an increment in the southern parts of Vavuniya, consequent on the restoration of several tanks in that part of the district.

I am indebted for these figures to Mr. Lewis' "Wanni Manuals" and they are reliable. Those given in Appendix E of Keane's report on irrigation are misleading as they ignore changes in the divisional rearrangements. Thus his figures for 1891, for Mullaitivu include those of Vavuniya, while those for former years were exclusive. His statement in the body of the report (p. 19) based on these returns, that "the population decreased by rates varying from 5·3 to 25·6 in the districts where irrigation works are situated," is entirely erroneous. As a matter of fact it is quite the contrary and the early results following on the improvement of the water supply have been remarkable and gratifying, as I will now proceed to prove.

But first it is necessary to ascertain as far as possible what was the rate of increase in the population in the dry zone of the Island in what may be termed ante-irrigation times, as a basis of comparison by which to judge the subsequent advance. The figures of the Wanni already quoted are perhaps too extreme to be taken for this purpose, but the returns for the Kurunegala district may be accepted as fairly typical. Here the earliest reliable information is for the period between the first two censuses, (1871 & 81) which discloses that the increase in the population in this interval was only 3·7 per cent., doubtless owing to the very limited cultivation of paddy, and the consequent short food supply, which the returns show existed from 1862 to 1877.

Between 1881 and 1891, the rate rose to 7·3 per cent. or nearly double, owing undoubtedly to the larger crops secured between 1878 and 1889, during which there was a liberal rainfall on the Western side of the Island.

As what was done in irrigation in Kurunegala prior to 1890 was very limited, the average of these two decades (5·4 per cent.) may be taken as the normal rate of increase in the population in the dry zone of the Island, before the restoration of the old irrigation works.

Between 1888 and 1897 climatic influences were less favourable and the crops in the district fell off 30 per cent., while the deaths registered exceeded the births by 3,000 between 1891 and 1901. Under these adverse circumstances the increase in this decade was only 6·8 per cent. though it was 10 per cent. in the villages served by the Deduru Oya scheme, which is equivalent to an abnormal addition of about 500 persons to the tax-paying community.

A forward policy which this state of affairs urgently called for, in regard to irrigation, only began in the closing years of the last century on the succession of the energetic Frank Fisher to the charge of the Province. As a result of the action taken the average crops between 1903-7 far exceeded any ever previously known and during the subsequent dry years they have equalled those of the most favourable years of the wet cycle.

Under these propitious conditions it is not surprising that the registered births (1901–11) exceeded the deaths by 23,000, and that the last census discloses an increase in the population during the ten years of over 63,000, equivalent to 26 per cent. or over 20 per cent. above the previous normal rate. I have not access to the details of the last enumeration, and cannot investigate if any other influences may have contributed to this happy result, but I think I am understating the case in claiming half of the abnormal increase, as owing to the improved food supply due to irrigation, realising an addition of over 24,000 to the tax payers of the district.

In the adjacent district of Nuwerakalawiya conditions were very similar prior to its conversion into a separate Province in 1871 when active measures were taken to ameliorate the state of the people, the chief of which was the repair of the village tanks.

In consequence of this, by 1875 the paddy crops had risen by 50 per cent. and continued to increase until the average production in 1888-92 was four times what it was in 1862-71. But for this fortunate addition to the food supply there is every reason for assuming the increase in population would have remained at the Kurunegala rate of 5·4 per cent. in each decade, and only reached about 68,000 by 1901, whereas the census taken in that year showed it had risen to over 79,000. To irrigation may, therefore, be credited the difference, 11,000, as superadded to the tax payers of the Province by 1901, while by 1911 the number had further increased to 14,500.

RECOUPMENTS.

The details given in the last chapter of the direct returns to be credited against the outlay on irrigation may be summarised as follows:—

Repayment of original cost ...	Rs.	328,967	
Repayments of maintenance ...	,,	62,808	
		391,775	
Rates in perpetuity	,,	665,413	
Land Sales	,,	1,067,892	2,125,008
Increased value of tythe			
In Batticaloa ..	,,	895,000	
In Matara ...	,,	560,000	
In the North-Central Province ...	,,	175,000	1,630,000
Probable returns from Kirema and Urubokka			230,000
Total ...	Rs.		3,985,080

Taking the total expenditure in round numbers as 9 millions of rupees and the recoupment at say 4 millions, the difference, 5 millions rupees, represents the net cost of the irrigation works completed and in working order at end of 1906, inclusive of maintenance.

In this connection it may be noted that if the grain tax had not been abolished, the increased tythe would have been now equivalent to about 5 per cent. per annum on the net outlay made up approximately as follows:—

Class I.	60,000 acres	@ Rs. 2 per annum	...	Rs. 120,000
Class II.	60,000 ,,	@ Rs. 1 ,,	...	,, 60,000
Class III.	160,000 ,,	@ 75 cts. ,,	...	,, 120,000
				Rs. 300,000

In making this estimate I have not overlooked the anticipation of the Committee of 1888 of a decrease in the revenue under this head, owing to the extension of the compulsory commutation system and the proposals for relief in certain cases, but holding this view overlooked the fact that an extension of cultivation was in progress which would have made up for any such reduction.

But though this asset has disappeared, there still remains a very substantial credit balance in favour of the paddy growers of the Island, in the large aggregate contribution made by them to the revenue during the 90 years prior to the abolition of the "grain tax" for which the industry received no return prior to 1856, and which has been practically ignored by those who have in recent years criticised the irrigation policy of the Government during the last quarter of the eighteenth century.

To ascertain the amount of this "nest egg," I have carefully examined the Blue Books of the Island, now stored in the Old Records Office in London, going back to the year 1820 and found the figures add to Rs. 45,487,000. Complete figures for the earlier 20 years of the Century are not available, but from the data available I estimate for that period another 4½ millions rupees should be included, making a total of say 50 million of rupees.

[This estimate is probably under the mark, as I have taken the value of the Rix dollar, in which currency the accounts were kept until 1832, at three-fourths of a rupee as the equivalent of 1/6; but as recorded in the minute of 1812 "it appears to have been originally valued at considerably higher than its intrinsic value with reference to the Star Pagoda" (a gold coin worth 7 shillings and 5 pence), viz., at 1/10¼d. It was then reduced to 1/9d. and in 1827 still further to 1/6d. It was at these rates the Rix dollars were converted into £.s.d. for the Blue Book returns transmitted to England.]

Besides the foregoing direct assets there are other indirect recoupments which have, in the past, been overlooked and never estimated. The chief of these is the additional contribution to the revenue by the increase in the number of tax payers, due to the remarkable advance over and above the usual rate, in the population of the districts where irrigation works have been constructed, thus providing a more ample food supply, a condition which, as is well established, increases the fecundity of both man and beast.

In Batticaloa the ordinary climatic conditions are less favourable than in Kurunegala inasmuch as the latter receives a share of the South-west monsoon rains, which the former never does, as shown by the figures for the annual fall being 59 "and 82" respectively. The rate of increase in population which prevailed in Kurunegala between 1871 and 1891 may consequently be taken as applicable, perhaps somewhat too favourably, to Batticaloa, prior to the restoration of the irrigation works, in the absence of any reliable figures of its own.

As already stated, the first irrigation works in this district were executed in Sir H. Ward's regime, and added largely to the local food supply during the ten years 1867 to 77. Since 1871 very considerabe sums have been expended in adding to the works in the district and the production of paddy has increased enormously, so that the average area cultivated in the period (1893–7) was *treble* and the crops six times what they were in 1851–6.

There are no reliable statistics as to the population ot the district previous to the census of 1871, when it was found to be a little over 93,000, and if there had been no irrigation undertaken, the increase would doubtless have been at the normal rate as in Kurunegala, viz., 5·4 per cent. in each decade. At this rate the population would have risen to about 109,400 by 1901, but it was actually 144,600, a superaddition of 35,200 to the tax-paying community of the district.

This very satisfactory rate of development has been somewhat checked in the last decade, owing to the adverse effect of the dry cycle, and the destruction of a very large and promising crop as well as much other damage, by the cyclone in 1907. Consequently the rate of increase in the population fell somewhat and the abnormal addition in the ten years was only 3,400, making a total of 38,600 extra tax-payers due to irrigation by 1911.

In Trincomalee there is every reason for believing the population had been dwindling prior to 1871, and in the subsequent ten years there was a reduction of 8 per cent. notwithstanding an increase of 1760 in the divisions served by the Kanthalie and Allai tanks restored in the seventies. By 1901 the population in these localities was 6,400 higher, or nearly 90 per cent. on the returns of 1871, but in the rest of the district there had been a loss of 2,000.

In view of this, the net increase of 4,400 in the whole district at least may be taken as the superaddition to the local taxpayers, due to irrigation. The subsequent net increase in the whole district up to 1901 of 1,300 may also be ascribed to the same cause, thanks to the abundant storage in the Kanthalai and Allai tanks, the latter being filled by floods in the Mahaveli Ganga.

In the Hambantota district, the early works in Sir H. Ward's time exercised a moderate effect on the food supply and the growth of the population, though a failure of the crops during the drought, which culminated in 1867, caused a very heavy mortality, but there are no reliable figures available until the census in 1871, when the number enumerated was 60,960.

Since that a considerable sum has been spent in improving the irrigation of the district and has been accompanied by increased production of the staple food supply. But for these remedial measures the rate of increase in population would undoubtedly have been the same as in Kurunegala, viz., 5·4 per cent. and the result would have been about 71,100 by 1901, whereas the census of that year found the number to be 104,800.

The difference between these figures 33,700 may therefore be accepted as the superaddition to the tax-payers of the district due to irrigation.

Here too the recent dry cycle has been unfavourable to the production of paddy in Giruwa Pattu West where four-fifths of the population ordinarily reside, and where according to the Pattu Mudaliyar's report (quoted in A. A.'s report of March 1908, Sessional Paper VI of 1908) since 1905, only one-fourth of the usual extent had been tilled and there was an insufficient supply for the Urubokka-Kirema streams. But a large number of the inhabitants of this subdivision have taken up the cultivation of land in the Eastern Pattus (under the Walawe scheme) and at Tihawe, where the soil is extremely fertile and the crops very large. Under these circumstances there has been a moderate increase in the population of the whole district, and a superaddition of 35,500 in the number of tax-payers due to irrigation by 1911.

(To be continued.)

RICE CULTURE IN THE PHILIPPINES.

The cultivation of rice has occupied the attention of the inhabitants of the Philippines for a longer time than any other one crop, and is to-day one of the most important crops because it furnishes nourishment to practically all the people, and is cultivated almost universally. The area under cultivation during 1911 was 1,043,757 hectares, which was nearly equal to the total combined area in abaca (Manilla hemp), corn, coconuts, sugar and tobacco,

The hectarage decreased slightly during 1911 but the average production per hectare was slightly increased, being 19·76 cavans* per hectare, as compared with 15·05 cavans for 1909.

The soils of the Philippines seems to be well suited to the growing of rice. Practically any soil in the Islands will grow rice if the necessary water is supplied and held on the plants. Since the retention of water seems to be one of the most essential characteristics, the mechanical nature of the soil should be taken into consideration in selecting a rice field. A fairly fertile soil containing about 50 per cent. of clay is best.

The rice plant is aquatic and requires more or less water about its roots at all times for its best development. The rainfall is depended upon to supply most of this water; only about 50,587 hectares are reported as under irrigation. As a rule the rice-growing provinces may be divided into two groups, those that have pronounced wet and dry seasons and those having the rainfall distributed through the year. In the first group may be placed the provinces of Bataan, Bulacan Cavite, Iloily, Laguna, Nueva, Ecija, Pampanga, Pangasinan, Rizal, Tarlac and La Union. Practically all the other rice-producing provinces fall in the second group.

The average variety of rice requires from one hundred and forty to one hundred and fifty days to mature.

The uncertainty of the time of beginning of the rainy season and the great quantity of water which may fall during a short period of time constitute practically the only drawbacks to the introduction of rice culture by machinery as followed in the United States.

It has been demonstrated that rice reaches its most perfect development, if grown during the rainy season, when the atmosphere is nearly saturated and the temperature is low. The crop grown during the hot dry weather does not yield as much as the former by 25 to 50 per cent.

Whatever method of planting and harvesting is followed, irrigation is almost essential to the best development of the crop. Irrigation water is necessary if two crops are to be grown and will be found valuable if only one crop is produced, as it frequently happens that the rains do not come in time to start the crop off properly and also there are dry periods in the so-called rainy season when a small amount of irrigation water would mean a 50 per cent. increase in yield.

It is estimated that it takes 100 to 116 hectare-centimeters of water, well distributed throughout the growing season (say eighty days), to produce a crop of rice. On an average there are about 155 centimeters of rainfall between June 1 and October 30. If it is well distributed this is abundant, but if not, irrigation water must be used to supplement the rainfall.

In case irrigation water taken from streams by gravity is not available it may be supplied from shallow wells or rivers at a cost not to exceed 22 per hectare by using a direct-connected centrifugal pump and kerosene engine.

* One cavan equals 75 litres.

An area of at least 50 hectares should be covered to bring the cost down to normal.

TRANSPLANTING.

When transplanted, the distance between the plants should be governed more or less by the variety. Those that have a tendency to throw out many shoots may be given more space; medium early varieties should be given from 15 to 20 centimeters each way, with three and four plants in a hill. If the young plants are 20 or 30 centimeters high at transplanting time, about one-third of the top should be cut off as there will be less danger of their being blown over by high winds and they will take root sooner. After the young plants have established themselves the water should be turned on and kept moving, as stagnant water is harmful to the plants.

Frequently the second crop, i.e., the crop grown during the dry season, is sown broadcast. If there is sufficient labour to transplant, it is not advisable to follow this system, except in rare cases, as much better yields may be expected from transplanting. It is estimated that only about one-half the yield may be expected from broadcasting as compared with transplanting.

The following lowland, white nonbearded, nonglutinous varieties gave a yield of more than 2,000 kilos, or 46·5 cavans per hectare as an average of three or more tests and may be recommended for general planting:—

No.	Name.	Yield of rough rice palay per hectare.	Province where obtained.	Days to mature.	Average number of grains per head.	Size of grain millimeters.
246	Caongedy	2652		137	212	5.5 x 3.0
827	Sipot	2412	Cebu	138	155	6.7 x 2.5
187	Cainti II	2402	Laguna	138	187	6.5 x 2.6
635	Mulan-av	2551	Bohol	141	212	6.0 x 3.0
530	Macan Pina	2659	Antique	143	243	6.5 x 2.6
61	Bengala	2440	Tarlac	143	213	6.1 x 2.6
813	Senora	2571	Capiz	145	191	6.7 x 2.6
663	Pauni	2310	Laguna	145	145	5.8 x 2.3
117	Bugaten	2875	Tarlac	149	256	5.5 x 2.7
868	Tinabas	2373	Cebu	149	187	7.0 x 2.5
710	Postoguer	2640	.....	153	181	8.7 x 3.5
781	Saigon IV	2511	.....	156	182	7.0 x 2.1
692	Piniling Daniel	2448	Antique	167	221	6.2 x 2.2
429	Inachupal	2408	Tarlac	168	241	5.9 x 2.4
447	Inasimang	2515	Tarlac	170	281	6.9 x 2.7
583	Mancasar	2378	Tarlac	174	227	6.3 x 2.5
88	Binatad	2407	Moro	175	184	6.1 x 2.6
527	Macan	2288	Nueva Ecija	178	200	6.[illegible] x 2.5
27	Bad-as	2371	Tarlac	180	152	5.0 x 2.6
579	Manabun-ac	2831	Occidental Negros	183	163	5.6 x 2.7
598	Manticanon	2561	Antique	185	233	6.2 x 2.7
739	Quinanay	2435	Tarlac	185	187	7.0 x 2.4
225	Calobang	2623	.....	186	323	6.2 x 2.4
473	Joquianan	2369	.....	189	273	5.6 x 2.8
756	Quinatia	2338	Iloilo	189	205	5.2 x 2.8

If any of the above-mentioned varieties are to be found in the reader's district, it would be well for him to secure a small quantity of seed of each

and make a comparative test. At harvest time select by examining each individual head to make sure of colour and conformity of type. Carefully preserve these heads until planting time. If irrigation water is available they may be planted as the second crop and the quantity of seed largely increased by the time the next wet season comes around. If the selected seed is kept pure there should be enough seed available to plant the entire crop at the beginning of the next wet season. Selection should be continued in this way each season for three or four seasons, choosing each time the best heads and from plants that are prolific. Even if only ordinary care is exercised in making selections, it should result in a variety that would give a larger yield and a palay of uniform size and quality.—The Philippine Agricultural Review.

MATERIAL FOR MAKING PAPER.

NEW INDUSTRY FOR UGANDA.

Wood-pulp is by far the most important material for making paper at the present day, and, owing to the wide distribution of the sources of supply —coniferous trees being the most suitable—it is the cheapest. Large quantities of straw-pulp also are imported into this country for the manufacture of brown papers and straw boards ; and bamboo is coming into prominence as a source of paper-pulp. A new material for making paper, "elephant-grass," from Uganda, is now suggested in an interesting article published in the current quarterly issue of the *Bulletin* of the Imperial Institute. This is a perennial grass, growing usually to a height of 6 ft. to 10 ft., and much higher on rich marshland. Occurring in a deep zone across tropical Africa, it is found chiefly along watercourses and in marshy depressions ; but it grows also in the more open parts of bush and forest lands. Both cattle and horses eat it readily. A sample of the dried mature grass was sent recently from Uganda to the Imperial Institute, with the object of ascertaining its suitability for the manufacture of paper. The Chief Forestry Office of the Protectorate stated that the grass was a source of annoyance and expense to agriculturists, as it grew rapidly after the aerial shoots had been burnt or cut down ; but that, if it could be used profitably for the manufacture of paper, a new and large industry could be built up. Since this grass is available in immense quantities, and at present has to be burnt each season in order to keep it down, it is important to find a commercial use for it.

The consignment, which weighed 177 lbs. when received at the Imperial Institute, and 145 lbs. on being air-dried, yielded, after treatment in the laboratories, a pulp of good colour, composed of ultimate fibres rather longer than those of esparto grass and about the same length as those of bamboo pulp. It furnished a fairly good paper. Owing to the light and bulky nature of "elephant grass," however, it is unlikely that the stems could be shipped profitably to Europe for paper-making ; but if the stems were converted into pulp at or near the sources of supply, by treatment with caustic soda, it is

possible (in the opinion of the experts) that a remunerative industry could be opened up, since the pulp probably would be approximately the same value for paper-making as wood-pulp prepared by the soda process—namely, £7 10s. to £8 12s. 6d. per ton in London (February, 1913.) Since there are immense deposits of soda in East Africa which could be utilized for the manufacture of pulp, there would appear to be some prospect of a new industry's growing up in this Protectorate.—THE MAIL.

PADDY EXPERIMENT AT KATUGASTOTA.

The accompanying photograph indicates the results of planting paddy in two different ways.

Seedling plants (three together) were put out on two plots of equal size. In the one case (A) seedlings were planted at an average distance of 7 inches apart, while in the other the distance was 3½ inches. Otherwise the conditions were the same in both cases.

The A plot gave signs of better growth from the first and in the end bushed out in the manner shown in the illustration.

WALTER MOLEGODE
Agricultural Instructor.

Illustrating the effect of transplanting Paddy at different spacings.
A=7 inches. B=3½ inches,

RAINFALL FOR APRIL.

Place.	1913 in.	1912 in.	Place.	1913 in.	1912 in.
Colombo ...	11·64	10·45	Kurunegala ...	8·78	5·83
Kandy ...	9·13	5·96	Batticaloa ...	·75	2·55
Galle ...	9·98	9·07	Badulla ...	5·50	6·16
Jaffna ...	1·15	1·02	Ratnapura ...	15·22	12·86
Anuradhapura ...	3·50	4·94	Nuwara Eliya ...	5·50	2·74

ROPY MILK.

The following extracts are from *Leaflet No. 266* issued by the Board of Agriculture and Fisheries :—Ropiness, however, is sometimes observed in milk from individual cows, notably in cases of inflammation of the udder. In such cases the cause may be either bacterial or non-bacterial. If the ropiness does not increase when the milk is kept and cannot be propagated by transference into another sample of fresh milk, it is probably due to the presence of fibrin and white corpuscles from the blood, which form masses of slimy material in the milk. Such milk ("garget" milk) may not cause other milk to become ropy, but organisms are present in the milk which may lead to infection being spread from one cow to another by the hands of the milker. For this reason prompt attention should be given to all cows suffering from this disease, and all sources of infection avoided. Milk of this nature should not be used for food.

In this leaflet the description "ropy milk" is confined to the first type of milk referred to; the leaflet does not deal with "garget" milk.

ROPY MILK ORGANISMS.

The organisms causing ropiness are very numerous and may be divided into two broad classes :—(1) Those which, in sterilised milk, possess the property of dissolving the casein, making a thick, honey-like solution when grown for some time. These organisms tend to produce an alkaline reaction in the milk, though some produce a little acid. In general they require a large amount of oxygen. (2) Those which do not dissolve the casein, but which, by means of the acid they produce, precipitate it (these include certain ordinary lactic bacteria). The quantity of acid produced in milk by these organisms is in some cases very large. These organisms are able to grow much better without air than the other type.

PREVENTIVE AND REMEDIAL MEASURES.

The bacilli causing ropiness are frequently found in water. Special care should, therefore, be taken in washing the milking pails, strainer cloth, &c., after each milking. When thoroughly clean these should be well scalded and

should not again be rinsed with cold water. It is well to scald the pails, &c., shortly before milking. Great care should be taken that no water is splashed into the milk in the process of cooling, &c.

Dust is also sometimes a carrier of the bacilli. The pails, &c., after washing should, therefore, be kept upside down, and the milk when it is in the pails should be kept covered as much as possible.

The rooms where the milk is kept should be well cleaned. Wooden, cement, or stone floors may be cleaned with a mixture of five parts of commercial sulphuric acid to ninety-five parts of water, but care should be taken that this does not get on the clothes of the person using it.

Wooden vessels should not be used for milk, as they may persistently retain the ropy milk organisms. It is inadvisable to use wooden troughs even for washing milking vessels, but when they are used special care should be taken to clean them each time after use.

Dilute solutions of washing soda favour the growth of the organisms, and it would be better to use sodium hypochlorite or some other cleanser and disinfectant in cases of an outbreak of ropy milk.

Straw, mouldy hay, and also Butterwort, have been shown to hold ropy milk organisms, and the custom of wiping the udders of the cows with a wisp of straw before milking is a bad one. After washing their hands for milking, milkers should not handle straw or fodder, nor should any such material be brought into the cow byre just before or during milking.

The organisms may be transferred to cows from water in which they have been standing, or which has otherwise been splashed on their flanks or udders. The cows should, therefore, be kept clean; and ponds should be fenced off so that the cows cannot wade in them.

On the first indication of an outbreak of ropy milk the cows should, if possible, at once be turned into another pasture.

NOTE.—A fuller account of Ropy Milk was given in the *Journal of the Board of Agriculture* for March, 1912, p. 991.

FLAX AND HEMP IN JAPAN.

The hemp industry in Japan was important even in the days when mechanical appliances were unknown, states *The Indian Market and Ceylon.* In the early part of the new *regime*, however, the necessity of employing modern methods in the production of hemp was realised by the Department of Agriculture and Commerce, which sent commissioners to France to study the flax industry there. Upon their recommendation the Government opened a factory at Otsu, in the Prefecture of Shiga, funds being contributed by the business men of that city, and operations were begun in 1885. This was the first flax spinning mill in Japan. Plantations were also started in Hokkaido for the cultivation of flax. The progress of the industry was rapid, and many new enterprises were undertaken, while the factory at Otsu passed to a private company, who are now the Imperial Hemp Manufacturing Company, Limited, of Tokyo, which has factories at Osaka, Otsu, Nikko-machi and Sapporo.

Its yearly output is about 3,500,000 yards of woven hemp stuff and 6,500 lbs. of hemp yarn. Besides this the company manufactures fishing nets, and even engages in the cultivation of hemp. The principal varieties of hemp and linen cloth manufactured are duck canvas, drill linen, and hose. Besides the plants of the Imperial Hemp Manufacturing Company there are some small factories in Yokohama and near Kobe. At present the exports of hemp are very small, but the demand for fish nets in America is increasing, and great hopes are entertained of the Chinese market in future.

SCIENCE TO THE AID OF AGRICULTURE.

Nature is wonderfully lavish in her gifts to man, but man has usually been slow to take advantage of his opportunities. For many thousands of years the waters of the Great Lakes have been thundering over Niagara Falls yet, until recently, no effort was ever made by anyone to utilize any of this immense power that was going to waste. Over every acre of land there stands about 35,000 tons of nitrogen, yet everywhere crops can be seen starving for want of nitrogen in the soil. Until a few years ago, the only way that nitrogen could be taken from the atmosphere and be converted into forms that plants could utilize, was by the action of bacteria, but this process is too slow for the up-to-date intensive farmer.

Science has come to the rescue of the farmer. The waters of Niagara Falls have been harnessed, to only a slight extent, it is true, but sufficient for the needs of many great industries. The trick of fixing atmospheric nitrogen into chemical forms that the farmer can use for plant food, is the work of two German scientists, Drs. Frank and Caro. The greatest heat and the greatest cold that they could produce are their agents, and lime, coke and air are their raw materials.

The lime and coke are fused together in an electric furnace. This furnace is so hot that lime, which cannot be fused in the hottest gas flame known, melts and runs like water in the electric furnace. As the lime melt it combines with the coke and forms carbide. This can be used for making acetylene gas if desired. When carbide is white-hot, however, it has the remarkable property of absorbing and fixing atmospheric nitrogen. But the nitrogen must be pure. To separate it from the oxygen with which it is mixed in the air, the air is subjected to an intense cold produced by a mechanical process of compression, cooling and expansion, until the air is liquified. The liquid air then being allowed to absorb heat, the nitrogen comes off as a pure gas, while the oxygen remains in the liquid. The carbide, finely powdered, is placed in electrically-heated cans, the pure nitrogen is admitted, and chemical fixation takes place, forming the new compound Cyanamid. A few simple mechanical operations put it into the form of a dark, granular material, that is packed in bags and sold to fertilizer manufacturers for the making of mixed fertilizers.

Cyanamid is now made in fourteen factories, located in all parts of the world—America, Germany, France, Italy, Switzerland, Austria, Norway, Japan, and India. So excellent have been the agricultural results following its use that the present factories cannot supply the demand, and new plants are now in process of construction, and enlargements are being made continually. The American Cyanamid Company at Niagara Falls, Canada, started three years ago with a capacity of 12,000 tons per annum. This is now increased to 25,000 tons, and in another year 50,000 tons will be produced annually. When it is considered that this quantity of Cyanamid, analyzing 18 to 20 per cent. ammonia, will furnish 160,000,000 pounds of nitrogen, and that this will fertilize more than ten million acres of land, some idea can be had of the tremendous effect that the Cyanamid industry will have on the future of agriculture. The lime that goes along with the nitrogen will also help to keep the soil sweet, and free from injurious acids.

Cyanamid can be stored indefinitely, retaining its good chemical condition, mixes well with other fertilizer materials, and sells at a moderate price. Its crop-producing power has been tested out all over the world, and has been found to be equal and often superior to that of the older nitrogeneous fertilizers. At present, Cyanamid is being used by over three hundred fertilizer manufacturers, in different parts of the United States, and the number is steadily increasing.—THE LOUISIANA PLANTER.

THE CAUSES OF INFERTILITY.

The following extract is from the Presidential Address delivered by F. B. GUTHRIE before the Agricultural Section of the Australasian Association for the Advancement of Science, Melbourne, 1913:—

In all these cases we have toxic conditions which are quite distinct from the infertile condition brought about by soil-exhaustion, conditions which are not dependent upon the richness or poverty of the soil, and which no amount of manuring in the ordinary sense will remedy. Indeed, when we consider the large stores of plant-food in average and even in poor soils, the comparatively small proportion removed by even the most exhausting crop, and the fact that this store of plant food is being constantly rendered available, it becomes difficult to realise that a few years' cropping can effect such a complete removal of plant-food as we must assume to take place if the soil is exhausted in the manner usually recognised.

As a matter of fact analyses of European soils go to show that under continuous cultivation there is little or no difference in the mineral content of the soil. In short, the inferior crop-producing power of a soil after repeated cropping is due to other and more obscure causes than the simple depletion of the soil in plant food.

It is open to doubt whether such a thing exists as an infertile soil, that is one which will not give satisfactory results under proper treatment. Plants, we know, can be grown in ignited sand or distilled water if the proper nourishment is supplied. The barren regions of the earth are all capable of being made reproductive under proper treatment, witness the alkali-lands of

Texas, and the salt-lands of Utah. Even the desert yields abundantly in the fortunate places where springs occur or where the land can be inundated by rivers. On the other hand misapplied energy may convert a fruitful country into an unproductive one ; and much of the desert and sterile land has once been fertile and has been brought to its present condition by unthrifty husbandry.

Travellers in Palestine tell us that its numberless hills are covered with the ruins of what have once been populous cities, a certain sign that the surrounding country has once been not only fertile but extensively cultivated to provide food for the town populations.

Sir Frederick Treves, the most recent visitor, records his impressions of this country in his work "The Land which is Desolate," contrasts the promised land "that floweth with milk and honey" with the "poverty stricken, miserly, thread-bare country" of to-day.

The plain on which the ruins of Babylon now stand is still covered with a network of old canals which served both to irrigate and to drain what was in ancient days extremely fertile country but which is now divided between desert and marshes. Herodotus testifies to the remarkable fertility of Babylon in his time when it was a great commercial centre.

Professor Heeren in his work on the "Commerce, etc., of the Principal Nations of Antiquity," tells us how the discovery of a new path to India across the ocean converted the great commerce of the world from a land-trade to a sea-trade and thus Nineveh "sunk to its original state of a stinking morass and barren steppe."

This is that same Nineveh, the capital of a country which its king described as "a land of corn and wine ; a land of bread and vineyards ; a land of oil-olive, and of honey."

There are many other instances where great and populous centres have flourished at the expense of the surrounding country which they have finally impoverished and involved in their own ruin ; and this is a danger, probably the greatest danger, with which rural Australia is faced to-day.

SAW DUST FOR STOCK.

F. Honcamp, reporting on the results of experiments carried out by him on the feeding and fattening of live stock at the Rostock Experiment Stations with the object of determining the value of foods recently put upon the market, says that the so-called molasses feeds in general consist of substances possessing very little or no nutritive value, mixed with molasses. In order to prevent the trade in these feeds, the special legal tariff No. 3 allows only those molasses feeds in which molasses is mixed with only one explicitly declared substance. Among the absorbents recently used there is solubilized sawdust, that is sawdust treated with sulphuric acid under pressure in order to transform the lignin and cutin into dextrose (20 to 25 per cent.) with the object of rendering it more palatable ; it is fed warm and mixed with a certain quantity of warm molasses. It was stated to have a high nutritive value but

the analysis made by the writer on the dry matter yielded the following results :—

	Crude Protein.	Nitrogen-free Extract.	Crude fat.	Crude Fibre.	Ash.
	per cent.	per cent.	per cent.	per cent.	per cent.
Crude sawdust ...	0·88	28·63	1·25	68·64	0·60
Solubilized sawdust	0·77	40·30	1·00	57·33	0·70

thus showing that the treatment does not modify the composition of the sawdust to any great extent. Nevertheless a portion of the cellulose is transformed into sugars (diminution of crude fibre and increase of nitrogen-free extract). The writer therefore conducted some experiments with the view of ascertaining how these sugars were utilized by animals.

The results of his experiments tallied with those of other previous investigators and showed that crude sawdust besides not being utilized actually diminishes the digestibility of other feeds mixed with it. Solubilized sawdust does not come up to the level of the straw of winter cereals, and when mixed with molasses ("bastol") its digestibility is practically nil. The price demanded for solubilized sawdust is 8 shillings per cwt.—a grossly exaggerated price.

It has been also suggested to mix sawdust with warm distillery by-products, but even this method does not yield utilizable feeds. Some years ago pine needles from which the resinous and tannic substances had been extracted were suggested as an absorbent for molasses. But experiments carried out then by the writer with maintenance rations showed that between the degree of digestibility of natural and exhausted needles there was no sensible difference. Recent experiments conducted by W. Schneidewind on sheep with fattening rations fully confirm the above results.—BULLETIN OF AGRICULTURAL INTELLIGENCE.

THE WORLD'S PRODUCTION AND CONSUMPTION OF BANANAS.

A Report on the world's production and consumption of bananas has been issued by the United States Consul at Port Antonio, Jamaica. According to this report Jamaica was far ahead of all other countries in the exportation of bananas during the calendar year 1911, having shipped a total of 16,497,385 bunches or stems, valued at £1,456,581, or more than one-half of the total value of all exports from the island in that year. Of the total number of bunches shipped, 15,944,188 were consigned to the United States, 522,000 bunches to the United Kingdom, and the remainder to Canada, Bermuda, and the British West Indies. Costa Rica ranked second after Jamaica as a producer of bananas, with exports of 9,310,000 bunches, and then came Honduras with 6,500,000 bunches, Colombia 4,202,000, Panama 4,261,000, Canary Islands 2,648,000, Cuba 2,500,000, Nicaragua 2,250,000, Guatemala 1,756,000, Mexico 750,000, British Honduras 525,000, Santo Domingo 400,000, Dutch Guiana 388,000, and other countries 250,000. It should be

borne in mind that the world's actual production of bananas is far greater than the amount exported, since there are many isolated regions, like the numerous island groups of the Pacific Ocean that have no foreign market for their abundant crops of this fruit, and in the countries which export bananas the home consumption is enormous. In Jamaica, as in other countries, the natives not only eat ripe bananas as a fruit but they boil the green fruit and eat it as a vegetable, and also use it in this form to fatten pigs.

As Jamaica is officially reported as having had 82,436 acres in bananas in 1911 when the exports amounted to over 16 million bunches, it appears that the average number of exportable bunches produced per acre was 200, and, as the average market price was a fraction over 1*s.* 1*d.* per bunch, the average gross yield for the island was £11 9*s.* per acre. In Panama and Costa Rica, where the land is very fertile and the plants are set farther apart, the average exportable crop is from 140 to 150 bunches an acre ; in Colombia it is nearly 200. The standard market bunch of bananas is one with nine hands (each group of bananas on the stem of the bunch is called a hand). The price, which varies with the season of the year, is quoted at so much a hundred bunches or counts. A bunch of nine hands or more is called a "count," one of eight hands is three-fourths, one of seven hands one-half, and a bunch of six hands one-fourth of a "count," so that four bunches of six hands each bring only as much as one of nine hands. Bunches with fewer than six hands are seldom exported. In order to avoid any ambiguity in the use of terms, the word "stems" is employed instead of "bunches" in the Jamaica Government statistics. The largest bunches are produced in the Bocas del Toro district in Panama, Costa Rica and Colombia ranking second and third respectively in this respect. Bunches of twelve to fifteen hands are not uncommon in Panama and Costa Rica, and a bunch of twenty-two hands was once grown in Panama. Notwithstanding the increased acreage in bananas, the Jamaica crop for 1912 shows a considerable decrease in consequence of an unusually protracted drought, and the crop was further damaged by hurricanes which swept the island on November 17th and 18th. As the loss in Jamaica will probably be more than offset by gains in Colombia, Panama, Guatemala, and other countries which have been steadily increasing the acreage under this crop, a small advance in the world's production may still be expected. The consumption of bananas in manufacturing food products, an industry which has assumed considerable importance in Jamaica, will be checked for some time owing to the destruction of fruit by storms and hurricanes.

While Jamaica exported nearly twice as many bananas last year as any other country, the United States imported more than five times as many as any other country. For the fiscal year ended June 30th, 1912, the bananas imported into the United States reached the enormous total of 44,520,000 bunches, valued at £2,993,000. Great Britain imported during the calendar year 1911 a total of 6,714,000 bunches, valued at £1,863,000. During the same year the value of balance (including banana food products) imported into Germany amounted to £411,000. Estimating the average number of bananas at 140 to the bunch, it appears that the people of the United States consume over 6,000,000,000 bananas a year or more than sixty for every man,

woman, and child in the United States, including Alaska and Hawaii. The increasing consumption of bananas in a number of countries naturally raises the question of an adequate supply to meet the coming demand. In Jamaica, where the immense banana crop is produced on about 3 per cent. of the total acreage of the island, there is yet plenty of suitable land available. In Mexico, Central America, Panama, and Colombia, not to mention the large possibilities of Haiti and the Dominican Republic, there are vast tracts of land where a fertile soil, a warm climate, and abundant rainfall favour the production of bananas on a large scale.—THE INDIAN TRADE JOURNAL.

AGRICULTURE IN INDIA.

INTERESTING ACHIEVEMENTS.

In the Government of India Report on the progress of Agriculture in India, many interesting achievements in the work of the Department are discussed. It is stated that in Bombay about 20,000 acres have been sown with improved cottons, with the seed of which it is expected ultimately to influence some 2,000,000 acres. In the Madras Presidency the increase in the area devoted to cotton during the past two years amounted to 600,000 acres and the present area exceeds that of any previous year by nearly 300,000. In Punjab preparations are being made for the spread of improved varieties, and the new Canal Colonies about to be opened offer facilities for the production of high grade cotton on a large scale. The improvement of the wheat crop both in respect of quality and yielding power continues to engage the attention of the Government. Dr. Barber has made a collection of the important sugar-canes of India and raised a large number of new seedlings, which will be soon experimented of the sugar-cane industry.

Consequent on the abolition of the post of Inspector-General of the Civil Veterinary Department, the Muktesar Research Laboratories and the publication of veterinary scientific works have been placed under the control of the Agricultural Adviser to the Government of India.

The Report dwells on the scourge of cattle disease in India, which is a direct obstacle to the amelioration of the condition of the cultivator. There are tracts in India which are entirely depopulated of their cattle by disease. With a view to combating disease, the Government have put up at Muktesar Laboratories for veterinary research and the manufacture of serum at an expense of over R40 lakhs. During the year 1911-12 no less than 583,256 cases of cattle disease were treated in the whole of India, and out of 285,299 cases of inoculations there were 1,782 deaths after inoculation; and there were 27,363 uninoculated deaths. The Report also deals with agricultural progress in the different Provinces and various other technical details.—M. MAIL.

CASTOR OIL PLANT IN CEYLON.

From reports received from the various Instructors of the Society it will be seen that there are generally to be found growing wild in patnas, chenas and gardens two varieties of castor oil plants (green stalked and red stalked). In the Eastern Province there are three varieties known as Mutu, Malay and Kattu Amanacu (castor); while in the Uva Province three varieties are reported—Mavata, Rataenduru and another (which evidently has no special designation). The trees attain a height of from 6 or 7 to 20 and even 30 feet and bear in heavy clusters. Though not cultivated as a rule in any particular locality in the Island, the bushes are to be found of one variety or another almost in any place and in any soil. The seed is not collected as a practice but occasionally people collect it and prepare oil which is used medicinally and for lighting.

In the native (Ayurvedic) medical treatment the plant takes an important place—the green variety being preferred: the roots are used in decoctions, and compounds for dislocations: leaves are boiled and used in fomentations, the water being used for bathing; seeds are used in compounds for abscesses and swellings.

The oil is not extracted as an industry in any locality as the imported and superior article is available cheap. But oil can be prepared just as from the coconut—that is in chekkus and by boiling. The process generally in practice is the latter. The seed is dried in the sun and when dried, shelled pounded and boiled in a quantity of water over which the oil floats and is removed by a spoon.

SCHOOL GARDENS IN CALIFORNIA.

The following results of school gardens in Memphis have been secured, says *The World's Chronicle*. Children have become interested in plant life; waste places have been made useful and beautiful; children have earned some spending money by wholesome and instructive outdoor work; fresh vegetables have been furnished for the home; homes have been made more beautiful and attractive. It is planned by the school board to procure twenty or more acres near a car line where the larger boys who are not employed during the summer may make truck gardening profitable and educative.

LOS ANGLES.

Over sixty school gardens are in operation in Los Angles, Cal. The largest ones are at Gardena Agricultural high school, where nearly ten acres are under cultivation, in grain, vegetables, flowers and fruits. The gardens of other schools range in size from a small bed or two to lots 50 x 200 feet. The latter have usually been loaned by citizens, who are glad to have children clear them and improve them by sightly flowers and vegetable plots. There is a supervisor of gardening with five assistants.

APICULTURE AS AN OCCUPATION FOR WOMEN.

By Mrs. E. L. SWOPE.

The reasons for keeping bees are many and various, and the business appeals to man, woman, youth and child. Bees have been a part of the conscious life of man from the beginning. Not only have they sweetened his daily bread with beneficent honey, but they have also set him an example far more uplifting than any other insect or animal creation.

Beekeeping is the one line of work that the busy woman or the woman of leisure can take up as a remunerative occupation. All beginners should be provided with a silk bee-veil and rubber gloves, because bees do not often attack rubber. They should also visit the bees often and keep up the acquaintance, but should not approach the front of the hive. Always approach a hive from the side or back. When thus protected by veil and gloves any one can handle bees without being stung. However, most people become immune to the poison after being stung a few times. When bee management has been properly learned bees are as easily handled as birds. Women can care for bees because there is little attention necessary unless one wishes to feed for early brood-rearing, or there is foul brood in the vicinity.

When the swarming season is at hand, and one is provided with a new sectional hive with frames properly fitted with brood-foundation starters, and an Alley queen and drone trap, the bees may be allowed to cluster in the trap or they may be left free to cluster elsewhere. If they cluster on a bush, cut the branch and lay it before the hive, preferably on a large sheet of cheap muslin. Then tap lightly with a stick, and you will soon experience a thrill of enthusiasm. The bees will march into the hive in regular order.

Women who keep bees are of great benefit to their homes and communities. The honey supplied is the most healthful, purest, and sweet the world knows, and is useful in a variety of ways. It may be used in its natural state on the table, in fruit canning, cooking, baking and candy-making—in fact, in anything that sugar and water are used in. It has greater sweetening power than most of the manufactured syrups, and, besides, possesses great medicinal value.

As a remunerative occupation for women it has been my experience that it is extremely profitable, clean, and healthful. When bees have been properly cared for during the winter and spring, and a proper method employed during the summer, a single swarm can produce from 50 to 200 one-pound sections of surplus honey which can always be sold at good prices. It is a business that can be carried on with one or two hives or one or two hundred. It can be carried on at home, thus affording a great opportunity for self-improvement. There should be at least one or two hives of bees in every garden, especially in the rural sections of our country, as the bee is the best pollenizer, and perfect pollenization means perfect fruit and grain. —GLEANINGS IN BEE CULTURE.

VILLAGE SHOW AT KALAWELLAWA.

The fourth Village Show in the Pasdum Korale East and the second of the series arranged for the year 1913 in the Kalutara district was held at the Government circuit bungalow at Kalawellawa in Pasdum Korale East on May 3, 1913, and was opened by Mr. G. F. Plant, the Assistant Government Agent of the district, in the presence of a large number of villagers, headmen and other visitors of whom there were several ladies and gentlemen of the planting community in the district.

The popularity of these shows is becoming more and more marked. This is evident from the extensive display of exhibits, and the big gathering of people present. Another popular feature of these shows is the notable increase in the number of prize donors year by year.

Almost all the classes were well represented. In the fruit class there was a satisfactory display of Kew and Mauritius pines, plantains, melons, limes and kamarangas. Among vegetables, chillies, capsicums, brinjals, bandakkas, pumpkins, snakegourds and bittergourds were good as regards both quantity and quality. Onions, ginger, turmeric, sugarcane, coconut and kapok were represented by creditable specimens. The exhibits of paddy, rice and dry grains though few were satisfactory. The industrial class included fine specimens of carved ornamental work, implements and mats. Needlework made rather a poor display but the poultry and eggs were quite creditable. Prizes were also awarded for the best bull and the best hackery turnout. The following School Gardens were awarded prizes:—

Bellana—all round best garden.—Silver Shield.

Warakagoda—for the best flower garden.—Silver Medal.

Bulatsinhala—for the best vegetable garden.—Silver Medal.

Mr. Plant gave away the prizes which consisted of Silver Medals and money, while certificates of honorary mention were also awarded. There were in addition a number of special money prizes offered by visitors.

For an exhibit of Upland cotton grown in the district and exhibited by Mr. Weerakkody, the exhibitor was given a special prize of Rs. 10/-.

N. WICKREMARATNE.

THE ABSORPTION OF PLANT FOOD.

The following is a summary of the results of investigations made by Pouget and Schuschak of the University of Algiers, as to the effect of the concentration of Nutritive Solutions upon the absorption of plants:—

Where the concentration of the solution was very low (under 0.1 mg. per litre for phosphoric acid) no absorption was observed; on the contrary, the plants excreted from their roots the nutritive matter which they had before absorbed in the organic and inorganic form. With the rise in concentration, the absorption is at first more rapid than the increase in concentration, till it reaches a certain point; beyond this point the absorption is strictly in proportion to the concentration of the solution; subsequently a point is reached when this ratio is disturbed, and the absorption increases more

slowly than the concentration rises; eventually, the absorption ceases to depend upon the concentration (the absorption of the nutritive substance from the solution is then regulated by its assimilation by the plant). It is clear that absorption depends upon the condition of the plants, their stage of growth, and upon external conditions (light, warmth, etc). It should also be noted that with solutions of very low concentration, the nutritive substance is absorbed much more rapidly than water.

These results show that soil solutions, in spite of their great want of concentration, play a very important part in crop development, as has been shown by Schlosing (the younger) and the writers in the case of the assimilation of phosphoric acid.

If the concentration of the soil solution is higher, as regards elements necessary for the nutrition of the plant, than the limit of concentration, the yield of the crop will depend upon other factors (climatic, biological, etc.)

If on the other hand a minimum quantity of one, or all, the nutritive substances is present and the concentration falls below the limit, the absorption of the substance in question and therefore the yield of the crop will be strictly dependent upon this concentration.

THE PHILIPPINE COCONUT INDUSTRY.

This is the title of a Bulletin issued by the Philippine Bureau of Agriculture and written by Mr. O. W. Barrett, chief of the Division of Horticulture, who places the coconut on the highest plane when he states that it is "the world's most important food fruit."

The suitability of this product to the conditions obtaining in the Philippines is unquestionable, and under the circumstances one is not surprised to find the author saying that there are numerous instances of palms fruiting in four years; but that with ordinary attention fruiting should begin 7 years after they are set out, while if there is no crop by the 8th year there must be something radically wrong with the site or the management.

The present output of the Philippines is set down at 175,000 tons copra or about a quarter of world's total output, and it is expected that the shipments will continue to increase at the rate of 15 to 20 per cent. per annum for a goodly number of years.

The number of bearing trees is reckoned at 30 millions, of non-bearing 20 millions: these occupying about 500,000 acres.

Mr. Barrett touches on the subject of the value of salt in coconut cultivation, which he does not believe in. Some of the best plantations in the world, he says, are located far from the Coast. The light nature of the soil and the proximity to moving water are probably the chief congenial conditions on the seaboard in our opinion.

Our author is not in favour of ploughing for aeration and advocates the use of a strong-tinned fork which should be thrust into the ground to a depth of 4 to 8 inches loosening it by moving the handle backwards and forwards and then withdrawing it without any prizing action. From 4 to 8 such

cavities are to be made in a space of 9 to 10 sq. feet. This operation, he contends, allows air and surface soil to enter, catches water, without damage to roots or retarding the action of soil bacteria.

He thinks 26 feet the smallest distance that should be allowed between trees and recommends 30 on deep alluvial soils, giving the preference to the quincunx system of planting.

Mr. Barrett discusses cover crops pretty fully and speaks highly of "Madre-de-Cacao" (*Gliricidia maculata*) grown as a shrub (particularly for exposed situations) in young plantations. He also strongly recommends "Dhall" (*Cajanus indicus*) with its dense head of foliage which is suitable for cattle fodder and its edible seeds, and claims for it all the benefits which any legume can be expected to confer.

He is strong in the conviction that grass exerts an injurious effect upon the coconut palm.

An interesting chapter is that on "Drying Copra" (1) in the ordinary kiln, (2) by sun and (3) in improved driers. The first takes from one to three days, the second from two to four of good sun, and the third from 8 to 20 hours depending on the temperature and type of drier—the rotary type turning out copra in about 5 hours.

The oil from kiln-made copra, which is only suitable for soap making and similar purposes tends to become rancid in the presence of moisture, and the manufacturer has yet to fully realise that rancidity means a loss of oil-content by the reduction of oil due to fungus growth. Europe alone is said to consume about 1,000 tons of copra per day in the manufacture of food products, and the production of a high class article will ere long become a necessity.

The author predicts that the time will come when planters will find it best to make their own oil and keep the refuse cake for cattle food or manure, and so give back to the land practically all that is taken from the soil, for the oil robs it of nothing.

Of the many smokeless driers in the market Mr. Barrett favours the steam-pipe-hot-oven and forced-draft-hot-air types. A description of the former and the advantages of using up-to-date methods in drying Copra will be referred to in the next issue.

C. D.

ARTIFICIAL RIPENING OF DATES.

In connection with the fruiting of the date palm at the Royal Botanic Gardens, Peradeniya, the following from the *Agricultural Gazette of New South Wales* is of interest :—

The Algerian date was introduced into the United States (Arizona and California) in 1900, but the fruit did not ripen properly on the tree. It has been proved that the dates may be ripened in twenty-four hours by incubation at a temperature of 43 to 49 degrees Centigrade. It has now been found that in presence of moisture the fruit can be slowly ripened at the ordinary temperature.

A temperature of 43 to 49 degrees Centigrade is equivalent to 109·4 to 120·2 degrees Fahrenheit.

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OUTLOOK FOR BRITISH FIJI.

RICH SOIL AND GOOD CLIMATE FAVOUR MANY TROPICAL CROPS.

The British Crown Colony of Fiji comprises many islands, reefs, and rocks, which lie between latitude 15° and 22° S. and between longitude 177° W. and 175° E. Altogether these islands and islets number from 200 to 250, about one-third being inhabited. The total area of this colony is 7,435 square miles, which is greater than the whole of the British West Indies. The town of Suva, the capital of the colony, is situated at the south-east end of the island known as Greater Fiji, in the province of Rewa. The European population was, at the latest return, 1,376, while native Fijians, with settlers from British India and other non European folk, make up a settled population of 5,000. Suva harbour is land-locked on three sides and has sufficient depth to afford anchorage to the largest vessels afloat. While inshore there is shallow water, there is sufficient wharfage accommodation for loading and discharging cargo. The Island of Vanua Levu, known to Europeans as Great Land, is, after Great Fiji, the most important island of this group, containing an area of about 2,432 square miles. It rejoices in the possession, on the south side, of the harbour of Savusavu, one of the finest in the Pacific Ocean. In the immediate vicinity of this port there are many Europeans, who are chiefly engaged in coconut and banana plantation, while some grow tea and other tropical crops. A notable enterprise in this island is the sawmill of the Pacific Lumber Company of Canada, which is engaged in cutting, dressing and exporting the timbers of the island, which are of excellent quality.

Another island of some importance is Taviuni, with an area of 217 square miles. European settlement is here relatively dense, the fertile soil especially favouring coconut planters. On the south side of this island a large tract of land, some 8,000 acres in extent, was acquired by the Government for the purpose of leasing to settlers. Among other islands in British Fiji, of more or less importance, are Kadavu, Ovalau, and Yasawa. Coconut plantations worked by Europeans as well as natives, are much in evidence and give more or less good results. Speaking generally, the more important islands of Fiji are mountainous and volcanic, rising sharply from the shore to a height of 4,000 or 4,500 ft. On the south-eastern or windward side the islands are often covered with dense forests of tropical vegetation. As a rule, the soil is deep and rich, while the land is well watered by abundant streams. In the main, this group is well provided with harbours and roadsteads. Considering the proximity of these islands to the Equator, they enjoy a remarkably healthy climate. This may be attributed to the sun's rays being greatly tempered by the cool trade winds that blow from the south-east.

The highest temperatures are experienced between the months of December and March, the lowest between July and September. The hot months are usually the wettest, though rainfall in many districts is very equably distributed. A good feature in the climate of these islands of the Pacific is their freedom from the worst forms of tropical disease. Malarial

fevers are said to be unknown, though dengue fever in a mild form is liable to attack Europeans who do not adopt certain precautions. On the whole, this part of the world is well adapted for British capitalists of moderate means who have any practical knowledge of coconut planting, sugar-cane raising and sugar production, and banana growing. The chief drawback is to be found in the hurricanes which from time to time sweep across this part of the Southern Pacific, leaving devastation in their track. Among the chief sufferers from these storms have been banana planters, who have on a few occasions suffered great loss.

FIJI'S CHIEF CROPS.

The chief crops of Fiji—that is, those which are spread over the largest area and are normally the most remunerative—are sugar-cane, coconuts, and bananas. The best sugar lands are found on the alluvial flats by the banks of the larger rivers. The earliest record of the production of granulated sugar in Fiji dates back to 1872, when Mr. Lester Smith, formerly a West Indian planter, initiated this industry, for which he was subsequently awarded a bonus by the Legislative Council. Since then sugar production has increased, and now holds the first place in the colony's exports.

Coconuts are chiefly raised in the islands of Taviuni and Rotumah and in the small islands of the Lau. Many of the European plantations have been established over a quarter of a century. This is undoubtedly a paying industry but is subject to the risk of hurricanes, as already noted. The banana thrives in many parts of Fiji, and is an important item among the exports. The average monthly export of bananas for the three years 1909 to 1911 to Australia alone was 509,501 bunches and 41,172 cases. Among minor, but still important, products of British Fiji is cotton, which was long the leading agricultural industry, until the fall in the price which took place after the American Civil War led to its culture being replaced by coconuts and sugar-cane. Limes, coffee, maize, rice, tobacco, oil seeds (such as peanuts and castor oil), spices of many kinds, with such starches as cassava and arrowroot, and last, but not least, sisal hemp, can all be grown with success in various ports of these favoured islands.—THE FINANCIAL NEWS.

AN APPEAL TO INDIA.

TO THE EDITOR OF THE TROPICAL AGRICULTURIST.

DEAR SIR,

I appeal to my countrymen and compatriots to come forward and do their utmost in a cause which affects human life and peace, prosperity and welfare of our motherland. I have succeeded in pointing out to the Indian Government and the Secretary of State for India through the medium of the official figures that millions of our infants are perishing every year from want of milk due to the shortness of cattle, of which also I have given convincing

evidence. From the figures quoted below it will be seen that the mortality amongst children of from 2 to 5 years of age is almost equally balanced in England and Wales, Australia and India whereas the mortality amongst infants of from 1 to 2 years of age is about 8% in England and Wales, about 7% in Australia and about 46% in Bombay Presidency alone, the Census of all India being not available yet:—

England & Wales.		Australia.		Bombay Presidency including Native States Agencies & Aden's	
Ages.	Population.	Ages.	Population.	Ages.	Population.
0-1	796,807	0-1	115,686	0-1	928,466
1-2	727,795	1-2	107,221	1-2	501,884
2-3	735,410	2-3	101,446	2-3	844,650
3-4	730,127	3-4	102,091	3-4	840,805
4-5	726,569	4-5	99,189	4-5	803,895

We must take every practical measure to minimise the indiscriminate slaughter of breeding animals, prevention being better than cure. I have also petitioned the Secretary of State for India, urging that the Indian Government should be asked to enact a law to protect and preserve prime cows under 7 years of age, and now I appeal to my countrymen, Hindus and Mohamedans, to join hands together in this common cause, if for no other reason at least for the sake of our poor infants whose lives it is our duty to save. I particularly appeal to the enlightened leaders of the Moslem Community to impress upon their co-religionists that the slaughter of our cattle and especially the prime cows means general disaster to the country and self-ruin, pointing out to them that the wise prophet Mahomet does not anywhere in the Koran enforce the sacrifice of cows for religious purposes.

All sections of Indian communities can co-operate in this great cause and Mohamedans can form Associations for the protection of our cattle, just as I have formed in England a similar British Association which many prominent Englishmen, including some members of Parliament, seeing the desirability of such a measure, have joined. If our countrymen, irrespective of caste or creed, adopt similar measures, they will be protecting infant life and their own material interests and contributing to the peace, prosperity and welfare of our motherland. Furthermore, it will be the means of strengthening our bond of loyalty to our Government. Many influential people in this country are in sympathy with us and are willing to render us whatever assistance they can, and now it remains for us to do what we can in the matter in perfect loyalty to our Government. I sincerely trust that my appeal will be heard in earnest and evoke ready response from my countrymen.

Any inquiries addressed to me to the care of Messrs. Thomas Cook & Sons, Ludgate Circus, London. E. C., I shall always be happy to answer.

London, 28th March, 1913. K. S. JASSAWALLA.

WOOD SEASONING BY ELECTRICITY.

The latest use for electricity is—wood seasoning! The process, which is said to have given very striking results in France, remarks the advocate of India, is a very simple one and it should have very satisfactory results in increasing the supply of marketable timber and thus in postponing the much discussed "famine" in that commodity—a famine which has induced such high prices as to seriously affect home building trade. Certainly the new method of seasoning is a great economiser of time. A water-tight tank of suitable size is the most expensive article. The timber is piled on a large lead plate at the bottom, until the tank is full, when a second lead plate is placed on top of the pile and connected to the negative pole of a dynamo, the bottom plate being connected to the positive pole. The space around the timber is then filled with a solution containing 5 per cent. of resin, 10 per cent. of borax, and a trace of carbonate of soda. On turning on the current it passes from plate to plate through the wood, driving out the sap, and the resin and borax takes its place in the cells and interstices. This process being completed, the timber is taken out and dried, when it is ready for use.—THE INDIAN AGRICULTURIST.

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HELPS AND HINDRANCES IN PHOTOGRAPHY.

A new photographic booklet bearing the above title has just been issued by Messrs. Burroughs, Welcome & Co. It contains a very succinct and at the same time interesting description of modern methods.

A picture of an African cocoa plantation serves to indicate the attractive brown tone which can be obtained by the use of 'Tabloid' Sèpia Toner. The print reproduced is from a negative developed with 'Tabloid' 'Rytol' by a lady Missionary when *en route* through the heart of Africa.

Working details of various toners are given including the 'Tabloid' Blue and Green Toners recently introduced. These are illustrated in colours, a particularly pleasing effect being reproduced from a print of a China jar toned with 'Tabloid' Blue Toner.

BAMBOO FOR PAPER-MAKING.

The following account on the use of the bamboo for paper-making is taken from the *Indian Agriculturist*:—

The question of the feasibility of utilising bamboos for paper-making continues to be investigated with great energy and with all the expert skill which the Government of India have at their disposal. The latest contribution to the inquiry comes from Mr. R. S. Pearson, Economist at the Forest Research Institute, Dehra Dun. It is interesting to note, in passing, that one of the earliest publications on the subject of paper materials in India was that of an Indian, Mr. Hem Chunder Kerr, who wrote on "The Cultivation of Jute in Bengal, and Indian Fibres available for the manufacture of Paper." The expert examination of the possibilities of bamboo began, however, in 1906, when Mr. Sindall, a well-known authority on paper-making, made laboratory experiments in the production of pulp from bamboos and carried out valuable preliminary inquiries into the probable yield of various species of bamboo and also into the cost of manufacture. Bamboo, considered as a paper-making material, presented not a few difficulties. The nodes were at first found so intractable that it was thought that the only method of dealing with them was to cut them out. This process besides being difficult and costly, would have seriously reduced the manufacturing value of the bamboo. Another problem was that of discovering a cheap and efficient means of bleaching the pulp. These obstacles have been overcome, largely through the patient experiments of Mr. W. Raitt, who demonstrated that, if the bamboo is crushed, the nodes can be used as easily as the internodes. He also showed that, so far as laboratory work is concerned, the bleaching of bamboo pulp can be more satisfactorily effected with sulphate than with caustic soda.

Mr. Pearson's special duty has been to discover suitable areas for the establishment of factories, to ascertain the cost of obtaining bamboos in various localities, and to examine generally the commercial aspects of a

bamboo paper industry. In Mr. Pearson's note some sixty pages are occupied with the information which he has collected regarding the extent to which places in these areas meet the requirements of paper-making. It is not enough, however, to obtain areas which are now well supplied with bamboos. An equally important necessity is that the supply should be capable of being renewed with sufficient rapidity to keep a mill working to its full capacity. The disadvantage of wood and esparto grass as materials has been that their natural increase does not keep pace with the demand, and the source of the raw material thus becomes further and further removed from the factory. An extremely interesting section of Mr. Pearson's Report deals with the effect of cutting on the productivity of the bamboo. His conclusion, after inspecting many areas in which the felling of bamboos has been carried on for many years, is that in " cases where a clump has been heavily cut over, the number of new stems put out is reduced according to the intensity of cutting, but that ultimately the clump recovers, if given even a short period of rest." This impression is confirmed by the statements of two Conservators of Forests. In the Tharrawaddy division of Burma two areas were operated upon, the annual shoots being cut; but in both cases "the experiment failed to have any appreciable effect on the vitality of the clumps." In another experiment a plot was "practically cleared of bamboos and undergrowth" for two years in succession. Yet in the fourth year fresh clumps had risen, and bore four or five stems on each clump. It would be difficult to imagine a more conclusive proof of the stubborn vitality of the bamboo. Given, therefore, reasonable treatment, the supply may be considered to be inexhaustible, except for the effects of the periodical flowering, which is still a somewhat obscure function of the bamboo. The process appears to be erratic, but this fact affords some guarantee that all the species are not likely to flower at the same time, so that, even if the local supply should be temporarily cut off the raw material can be obtained elsewhere, though at an increased cost. As for the results of manufacturing on a commercial scale the experiments made by Messrs. Heilgers & Co., who are supplied with 80 tons of bamboos for the purpose, enable Mr. Pearson to affirm that, with liberal estmates for all kinds of outlay, the total cost of producing unbleached bamboo pulp works out at "Rs.32 per ton lower than that for imported unbleached spruce-sulphite, and Rs.24 per ton lower than the cost of producing unbleached Sabai grass pulp." These are figures which can hardly fail to attract the attention of capitalists.

COMMISSIONER BOOTH-TUCKER ON SILK CULTURE IN CEYLON.

The Director of Agriculture has received a report on the Peradeniya Silk Farm which is under the management of the Salvation Army. The report is by Commissioner Booth-Tucker from notes supplied by the Manager of the farm, Captain Jorgensen. We take the following from it:—

The Silk Farm at Peradeniya has been under the management of the Salvation Army for a period of about 2½ years.

The Farm consists of about 7 acres and the whole of this tract has been planted with Mulberry, demonstrating that it can easily be cultivated by any villager. There is no doubt that the mulberry will grow in either bush or tree form in any part of Ceylon. This has also been found to be the case all over India.

The two kinds of mulberry which have been found the most useful for silkworm cultivation are the *Morus alba* and the *Morus Indica*, but there are again many varieties of both.

Four varieties of mulberry trees are growing on the Farm, of which the Italian are the best as they give much larger leaves than the Indian ; the bushes are more tender, and do not stand so much pruning as the Indian variety. The latter can be grown like tea bushes and pruned down four times a year; but bush mulberry requires better soil and more labour expended on them than the trees.

The situation of the Silk Farm is not very good for the purpose in view, as it is surrounded with tea gardens and work is plentiful and highly paid. On the other hand, as a training ground for Silk Students the situation is excellent.

I would also call attention to the fact that the Hungarian Government has made a specialty of utilising schools for the popularising of sericulture in Hungary with great success. Teachers in sericultural districts have to go through a short course of sericulture in order to enable them to teach the children. As a result of this policy, many tons of cocoons are now produced in agricultural districts where, a few years ago, the industry was absolutely unknown.

SPECIES OF SILKWORM CULTIVATED AT PERADENIYA.

The following species of silkworms have been cultivated at the Farm:—

i.—*French Silkworms Univoltine.*—The seed was obtained from a leading firm in France, was kept in cold storage at Simla and despatched to Peradeniya towards the end of December. (Some specimens of the cocoons are forwarded herewith.)

The following Indian varieties were also grown:—

ii.—*Barapalu*, Bengal Univoltine ;

iii.—*Nistara*, Bengal Multivoltine, and

iv.—*Mysore*, Multivoltine.

The above varieties all feed on the Mulberry.

v.—*Eri* Silkworms were also cultivated, and were fed on Castor leaves.

(Specimens of the cocoons produced are forwarded herewith.)

It is worthy of note that the worms cultivated at the Farm matured in shorter periods than is usual in most places : the Eri in 18 days ; the Nistari in 21 days ; the Barapalu in 26 days ; the Mysore in 30-32 days ; the French in 30 days.

Experiments are also about to be made with the Muga silkworm. This is a native of Assam and feeds on various kinds of Laurel, Cinnamon, Banyan Peepul, etc.

The disadvantage at present of the Muga is that the silk is unknown to the European markets, but there appears no difficulty in disposing of it in India. The silk is brilliant and easily reeled and makes excellent cloth, which commands a ready sale in the Indian market.

The fact that the worm feeds on different varieties of leaves, and in particular that it appears to thrive on the cinnamon leaf, makes it probable that it would do well in Ceylon ; and the brilliance of the silk and the fact that it is easily reeled, makes it probable that it will ultimately be more popular than the Eri and even more easy for cultivation.

While the Eri silk lacks lustre, it is very strong and is readily sold at a fair price. The worm itself is healthy, but the thread cannot be reeled, It is thought that this fact may make it more popular in the Buddhist portions of Ceylon, as the moths are allowed to escape and the thread is spun instead of being reeled. It should be remembered, however, that the same thing can be done with any kinds of cocoon. The pierced Mulberry cocoons command a better price than the pierced Eri cocoons, and there is no reason whatever why persons who object to the taking of life should not allow the moths to escape, as they would still be able to sell the pierced cocoons at a profit.

There is another point to remember in this connection and that is that persons who object to the taking of life can engage in the *Grainage* business and produce disease-free eggs for the market, instead of producing cocoons for reeling. In this case, again, the moths would be allowed to escape and the cocoons could still be sold as pierced cocoons. This is what is commonly known as the Grainage business and there seems every reason to believe that Ceylon would prove an excellent country for the production of disease free seed for the whole of the Orient.

MARKET FOR COCOONS.

Arrangements are now being made for starting a filature in Colombo in "The Salvation Army Home for Vagrants." There will probably also be a branch of this institution in Kandy and possibly elsewhere. Thus there will be a home market for all the cocoons that can be produced in the Island and it is probable that this will give an impetus to the industry.

The silk will not only be reeled but twisted and woven and, in the course of time, also dyed. Thus the different processes can be taught to students without any necessity for their leaving the Island.

At the same time it must be remembered that owing to the increased demand for labour and the high wages paid, the silk Industry has many difficulties to contend with in Ceylon which it does not posssess in less favoured localities, and time and patience will be requisite for the introduction of the industry throughout the country.

ADVANTAGES OF GOOD CULTIVATION.

Mr. B. G. Brooks, Instructor in Agriculture, has contributed the following article to the *Queensland Agricultural Journal* of February, 1913:—In the successful raising of farm crops the management of the soil is of the greatest importance. It is only necessary to observe the variations in the yield of similar crops on adjoining fields to find that, were up-to-date methods more generally practised in the preparation of the soil, the returns per acre would be materially increased.

When a crop fails the cause is, unfortunately, too often set down to adverse climate conditions. Although the weather has undoubtedly a very important bearing upon crop production, yet it is not always responsible for the poor returns.

In my travels throughout the various districts of the State, I have ample opportunity of studying the respective methods practised in the raising of crops and the results obtained thereby.

It is not an infrequent occurrence to come across a farmer harvesting a very heavy crop on one side of the fence, while his neighbour on the other, on similar soil, is reaping practically a failure. It is, therefore, necessary to look to some cause other than the weather for this disparity. Perhaps there is some truth in the remark made by the farmer who was harvesting a fine crop while his neighbour was reaping a poor one. When asked the reason for the difference, his reply was, "I cultivated my soil—my neighbour irritates his."

The problem relating to soil fertility and crop production has received much attention from agricultural scientists during recent years, and although much has been achieved, there still remains a very large field for investigation. Much prominence has been given, both in Australia and America, to the raising of crops with a minimum amount of rainfall, and it must be admitted that marvellous results have already been secured by the adoption of the methods advocated.

The foundation stone upon which the success of the dry-farming system rests is fallowing—that is, keeping the soil cultivated and only taking a crop every alternate year.

So far, fallowing has received little or no attention in our State. On the other hand, the practice of securing two crops during the year is quite a general one, and this is undoubtedly, to a large extent, responsible for the low average yield obtained from some of our staple crops. I find that one of the most important factors in successful crop production is the early preparation of the land, but, with the system of double cropping just mentioned, this cannot be given effect to. I am not inferring that cultivation is carried out in a slipshod manner, for it may be that every care has been taken in ploughing and pulverising the soil to form the necessary seed bed, but, unless a certain period is allowed for the soil to "mature," or, in other words, to permit of the necessary plant food becoming available for the needs of the crop, it is impossible to secure a full return.

This point is not at all difficult to demonstrate. It is only necessary to take a quickly maturing crop, such as Panicum, and watch results. As an example, I will relate one experience of many I had, showing the effect of early and late preparation. In a field of 30 acres, 10 were ploughed four months; 10, two months; and 10, just previous to planting. The whole area was planted with Panicum at the same time. The result in green material cut for silage was:—for the four months, 12 tons per acre; for the two months, 6 tons per acre; and for the portion ploughed previous to planting, nil.

Although the weather was very favourable during the growing period, the seed on the freshly ploughed area practically refused to germinate—only a few small patches appearing where timber had been burned off. This failure of seed to germinate when sown in newly-ploughed land, more especially where the soil is of a stiff character, has often been observed. Germination will eventually take place, but it may be weeks or months later. Numerous examples of a similar nature were to be met with in the 1911 wheat crop, and to a lesser extent during the past season. In every district individual fields were to be met with giving a good yield, while adjoining areas were practically a failure. On investigation it was discovered that, in almost every instance, early preparation of the land was responsible for the successful returns.

BRONCHO GRASS IN SOUTH AFRICA.

Amongst interesting notes by Mr. Joseph Burtt-Davy, F. L. S., in the December number of the Agricultural Journal of the Union of South Africa is one on the Broncho Grass (Broncus maximus Defs.), which it is said is killing the Lucerne in Oudtshoorn, and is otherwise a troublesome weed especially in regions of winter rainfall. In California it has monopolised thousands of acres of veldt, to the exclusion of other grasses and herbage, and although a good winter grower, furnishing a quantity of winter green stuff, this grass is not eaten by stock. As it becomes old, the long-barbed crowns get into the nostrils, mouths and eyes of the animals, often causing much damage, in addition to this it is injurious to the wool. From its hardy nature and drought-resisting qualities, it overtops and chokes out such of the finer and better grasses, as make less rapid growth. Mr. Burtt-Davy says :—"It is the growth of grasses of this character which has induced me to recommend drilling the Lucerne in rows about 9 inches apart, which allows a cultivator to clear out the grass to better advantage."—THE GARDENER'S CHRONICLE.

ARTIFICIAL VANILLIN.

Vanillin, as its name implies, is the crystalline substance deposited on the outside of the pods or fruits of Vanilla planifolia in the course of preparation

for commerce. It is also found in other vegetable products, besides being produced artificially, chiefly from eugenol, which is the most important constituent of oil of Cloves. So that anything affecting the supply of Clove oil would naturally diminish the supply of vanillin; but, when phenol or carbolic acid is suggested as the substance to take its place, notwithstanding all the marvels of chemistry at the present day, it seems necessary that precaution should be taken, especially as the vanilla flavour for sweet-meats and confectionery is so popular at the present time.—THE GARDENER'S CHRONICLE.

THE INHERITANCE OF FECUNDITY.

The following account is from the *Gardeners' Chronicle* of February 1913:— Few problems are of more practical importance to the plant-breeder and stock raiser than those which concern the inheritance of the capacity for producing large numbers of offspring. Yet, notwithstanding the great commercial value that a knowledge of the mode of inheritance of fecundity might have, there is a remarkable lack of experimental data on which to found a serviceable working hypothesis.

We know, it is true, not a little with respect to the effect of cross-breeding in increasing the yield of certain plants, and we know also from Darwin's experiments that continued self-fertilisation results, in certain cases, in a striking reduction in the number of seeds. Even these well known facts still await a scientific explanation, and beyond them our knowledge does not at present extend. Of a row of Peas, for example, we have no published information of the relative contributions made by the individual plants to the harvest. Nor may we say at present—even though it were shown that certain plants contribute more than their due share—that the degree of fecundity exhibited by individual plants is an hereditament. We are apt to assume the fact of a plant yielding more than the normal quota of seed is to be attributed to specially favourable conditions, and to regard such disparities of yield as we may observe among a group of pure-bred plants as the consequence of lack of uniformity in the conditions of soil and of air to which the plants have been exposed. In the absence of exact knowledge derived from definite experiment, such opinions are beyond the pale of criticism. To discuss them in the light of general knowledge is but to waste time and intelligence.

What is required is a careful statistical inquiry into the facts. Such an inquiry is bound to be tedious, but it is bound also to lead to interesting results, and it might give us conclusions of the highest practical importance to horticulture and agriculture. Recent experiments on the fecundity of fowls appear to show that this character is now less hereditable than are those less elusive properties of the organism which are used generally by students of genetics as subjects for their inquiries. Mr. Daymond Pearl, to whom these experiments are due, has arrived at the following interesting conclusions with respect to the mode of inheritance of fecundity. A certain low average power of egg production depends on the presence in the hen of a single Mendelian factor, which he denotes by the letter L1. Given the power of producing eggs, that is, given a normal female, the number of eggs produced in a year will depend on the presence or absence of this factor.

If it be present the number will reach a certain maximum, e.g., a winter record of under 30 eggs. But for a bird to be a copious layer a second Mendelian factor must also be present. In other words, and denting this latter factor by L2, only birds of the constitution L1 L2 possess a high degree of fecundity. Such L1 L2 birds alone among the denizens of the fowl-run are capable of producing a winter record of more than 30 eggs.

Further, the mode of inheritance of these factors L1 L2 is not identical and therein lies the fact that the fancier has not succeeded hitherto in raising races of hens guaranteed to be prolific. As he has discovered, good layers may beget indifferent layers, and from indifferent layers may proceed good layers. This arbitrary and disobliging behaviour is to be attributed to the curious mode of inheritance of the factor for high fecundity. According to Mr. Pearl's observations the factor for femaleness (F) and that for high fecundity (L2) cannot occur together in a sexual cell. The latter factor must therefore be supplied always by the male bird. Hence the task of the poultry raiser must be first to obtain males and females pure for L1, for that is the factor which lays, as it were, the foundations of fecundity, and, second, to see that the male birds are pure for L2, the factor which builds high fertility on the basis of L1.

SOME OF THE NEXT STEPS IN BOTANICAL SCIENCE.

Nature of January 30th reports in full the Address delivered by Professor C. E. Bessey before the American Association for the Advancement of Science at Cleveland, Ohio. The lecturer in dealing with the question of the future of botanical science said, "Let us turn now to the future of botanical science, and endeavour to trace its more profitable course of development during the next one or two decades. What are seemingly to be the demands of modern society upon this science? What are to be some of the next steps in its evolution? For whatever we may say in regard to the independence of science we cannot escape the fact that it must serve its 'day and generation.' No science can hope for support or recognition that does not respond to the demands of its age.

"My first inquiry may well concern itself with the content of botanical science in the immediate future. As we become better acquainted with it and recognise more clearly its relations to the activities of the community we shall be able to define its proper content with more accuracy. And let no man attempt to belittle the importance of such an undertaking. I am well aware of the impossibility of absolutely delimiting botany from every other science, and especially of doing so with reference to many of its applications, and I am fully aware of the fact that the limits of any science are subject to change with the progress of human knowledge. Now and then there must be a "rectification of the frontier" in respect to the boundaries of science. So without doubt we shall have to add to or subtract from the area now allotted to botany.

It still is true that the field of botany may be considered in three parts—structure, physiology and taxonomy. Beginning with such structures as are obvious to our unaided eyes, we have carried out studies to the minute structure of the tissues, and the cells which compose them. We are able now to peer into the protoplasmic recesses of the living cell, and while we cannot say that we have seen life, we have seen where life is, and what it does. Cytology, histology and morphology in our modern laboratories have greatly changed our conception of the structure of the plant. It is no longer made up of forms to be compared because of their general similarity of outline, or of position in the plant body. The plant as a whole is a community of variously differentiated living units, just as is each of its organs. It is a complex community in which there is a measure of individual independence of the units, along with much of mutual dependence.

"This leads me easily to that portion of the field of botany that has to do with the activities of plants and their organs, physiology—the scope of which has been so greatly extended in these later years. Here such inquiries as those pertaining to nutrition, growth, sensibility, reproduction, are of primary importance. The introduction of the experimental method of inquiry has made this a favourite department of the science. Who does not enjoy catching a plant, tying it up in a corner, and compelling it to do something, while we watch for the result? This kind of study appeals especially to those who are looking for demonstrations, and for this reason plant physiology has been increasingly popular. Some botanists, indeed, have gone so far as to insist upon giving first place to physiology. Yet it is well for us to remember that the plant is first of all a structure, the complexity of which may well challenge the most acute minds. We find it far easier to record the responses of plants to our planned stimuli than to unravel a structural complex, and so no doubt we shall continue to entertain ourselves and our students with what are too often futile experiments.

"In this part of the botanical field are pathology, which grew up from our observation that organs may not respond normally; ecology, which developed from the observation that plants tend to live in communities; and phytogeography, having to do with the means for, and the results of, distribution.

"Taxonomy, or as we used to call it, classification, occupying the third division of the field of botany, long received the almost exclusive attention of botanists. And even to-day it is the pretty general opinion of our non-botanical friends that we are constantly employed in collecting specimens, and in some intricate and mysterious way determining their classification and affixing to them their proper Latin names. And it must be admitted that every botanist does a good deal of just such work.

"When the doctrine of evolution came into botany it brought with it the idea of descent, and thereafter taxonomy included phylogeny. Today the taxonomist is no longer content to stop with a knowledge of the structural differences between plants; he must know how this structure arose from that; he must know which is the primitive structure and which the derived. Phylogeny has so far entered into taxonomy that it has given new meaning to

the work of the systematic botanist, and it is bringing into this department of the science something of the philosophical aspect which was nearly wanting heretofore. That this must be the direction of the development of the taxonomy of the future is without question, and we may look confidently for a marked expansion and enlargement of the phyletic idea in botanical taxonomy.

"Already we have stations for the study of plants under particular environments, as our seaside stations, our mountain stations, and a single desert station. I take it that these are suggestive of what are to come in the future. Instead of trying to make seaside conditions away from the sea, we go to the sea and there set up our laboratories. So when we want to know how plants behave in the desert we go to the desert. And this is no doubt to be the direction of botanical investigation. We are going to study plants under their natural environment, and to the seaside laboratories we shall add (as indeed we have already to a limited extent) lakeside laboratories, riverside laboratories, swamp laboratories, forest laboratories, field laboratories. Already the tropical laboratories in Java, Ceylon and Jamaica, have justified themselves, and no doubt to these we shall soon add Arctic and Tundra laboratories. All this signifies that more and more we are going to see what the plant is doing in its natural environment, and when we can undertake intelligently to watch it under a changed environment. So the future is to witness a great increase in the number of these laboratories, and how far it will go can only be conjectured."

THE HUMANE SLAUGHTERING OF ANIMALS.

3, Lauder Road,

EDINBURGH, 15th February, 1913.

TO THE EDITOR OF THE "TROPICAL AGRICULTURIST."

DEAR SIR,

As Chairman of the Committee on Humane Slaughtering which has been holding its deliberations at 105 Jermyn Street, London, under the auspices of the R. S. P. C. A., and in view of the great demonstration of Humane Slaughtering to be given at Edinburgh Abattoir on 20th February, I have been asked to summarise and issue for general information, a short account of what has been done so far in this matter. I have therefore the pleasure to enclose you a brochure which gives the facts, and I sincerely hope that you will see your way to use this in your columns.

Yours faithfully,

LOUDON M. DOUGLAS.

REPORT OF THE COMMITTEE.

Much attention has recently been directed to the methods adopted for the slaughtering of animals for food, and a strong case has been made out for reform in the methods at present in use. Hitherto the treatment of animals in public or private slaughter-houses has not attracted much attention, as it is a subject which has not appealed to the average refined taste. That, however, is an attitude which is regrettable, as the magnitude of the meat industry is such as to warrant very special control and regulation.

It will astonish a good many people to know that last year we consumed more than 1,000,000 tons of home-grown beef and mutton, a quantity running into many millions of cattle and sheep. In addition, it has been computed that we consumed well over three million home-grown pigs.

ABATTOIRS.

Many of the animals referred to and indeed the large majority of them were handled in public abattoirs, but the percentage so dealt with was much greater in Scotland than in any other part of the United Kingdom, owing to the fact that the private abattoir has been almost entirely abolished throughout the country. Nearly all the Scottish Burghs in particular possess public abattoirs and, as a consequence, fully 90 per cent. of the meat supplied in these Burghs has passed through abattoirs which are thoroughly under control. It seems a very curious thing that there should be so much opposition in England and Wales to the establishment of the public abattoir system, considering that it has been so highly successful in Scotland.

METHODS OF CONTROL.

It will be obvious that any general regulations which may come into force in connection with humane slaughtering will be more easily applied in the case of public abattoirs than in private establishments, as the control over the latter is much less effective than in the larger institutions. It is quite possible, for example, that local authorities in the Burghs may be authorised to impose regulations with regard to slaughtering, which would not apply to private slaughter houses outside these areas; this would therefore point to legislation being passed which would regulate slaughtering in every establishment where it is carried on.

HISTORY OF THE SUBJECT.

The agitation in connection with humane slaughtering began about ten years ago, and it first of all resulted in the appointment of a Committee by the Admiralty to enquire into the whole subject. This Committee reported in 1904, and the following is a summary of the recommendations which they made:—

(a) All animals, without exception, must be stunned, or otherwise rendered unconscious, before blood is drawn;

(b) Animals awaiting slaughter must be so placed that they cannot see into the slaughter-house, and the doors of the latter must be kept closed whilst slaughtering is going on ;

(c) The drainage of the slaughter-house must be so arranged that no blood or other refuse can flow out within sight or smell of animals awaiting slaughter, and no such refuse shall be deposited in proximity to the waiting-pens ;

(d) If more animals than one are being slaughtered in one slaughter-house at the same time, they must not be within view of each other ;

(e) None but licensed men shall be employed in or about slaughter-houses.

Since then the agitation has been continued, but there has been no attempt made to enforce any of these recommendations. A great advance, however, has been made through the action of the Royal Society for the Prevention of Cruelty to Animals in perfecting humane slaughtering instruments and in giving public demonstrations so as to convince all those interested that these instruments are perferable to the traditional weapons generally in use.

In 1911 a Bill was introduced into the House of Commons, having for its object the regulation of slaughter-houses throughout the United Kingdom, but it was not proceeded with and since then the Royal Society for the Prevention of Cruelty to Animals has carried on the work of education of the Meat Industry in this matter.

At the beginning of 1912 a Committee was formed, and met at the rooms of the Society at 105, Jermyn Street, London. The members of the Committee were as follows:—

Messrs. Christopher Cash, B.A., author of many works on humane slaughtering ; Wyndham Cottell, M. A., M. D. ; W. Gordon Barnes, M. R. C, V. S. Veterinary Inspector at Islington Abattoirs, London ; George Greenwood, M. P. ; Major W. Melvillee Lee ; Alderman John Lindsay, ex-President of the National Federation of Meat Traders ; R. D. Paddison ; Henry Toomer, President of the Southampton Meat Traders' Association; and Loudon M. Douglas, F. R. S. E., of Edinburgh, Technical Adviser on Animal Industries, who was appointed Chairman. Mr. L. Y. Squire, of the R. S. P. C. A. acted as Honorary Secretary.

The various methods of slaughter by the modern humane instruments were fully investigated, and two demonstrations were arranged at Islington Abattoir, when the various weapons were used on cattle, sheep, and pigs. The general principle of all of these weapons is that a captive bolt is discharged with great force, either by means of a cartridge or a spring. The

bolt penetrates the skull of the animal and instantly lacerates the brain thus producing unconsciousness. Another form of weapon, however, is the Ransom Killer, which uses compressed air as the propelling force, and the development of this appliance is due to the enterprise of the Council of Justice to Animals, a Society whose objects are somewhat similar to those of the R. S. P. C. A.

DEMONSTRATION IN EDINBURGH.

Following upon the demonstrations which have been given at Islington, it was recently decided by the R. S. P. C. A. that they would give a similar demonstration in Edinburgh at the Public Abattoir there. In this project they have met with the hearty co-operation of the Lord Provost and Magistrates, and the Town Council and Markets Committee have given every possible assistance in the organising of the Demonstration, which will take place at the Public Abattoir at Gorgie on the 20th inst. The principal organiser of the Demonstration is Mr. Councillor T. G. Fisher, and he has been ably assisted by Mr. James Cochrane, Superintendent of Markets. Representatives from the various Meat Trade Associations will be present, and already a large number of public men have intimated their intention of seeing the Demonstration for themselves. Humane slaughtering instruments of the different types will be used on cattle, sheep and pigs, and in order to demonstrate that there is no special skill required in using these instruments, they will be used by the slaughter-men attached to the Abattoir. It is hoped in this way to direct attention to the matter throughout Scotland and give a great impetus to what the promoters believe to be the cause of humanity.

THE WAX PALM

A New and Promising Cultivation of great importance to all Tropical Planters.

The Wax Palm (Copernicia cerifera) produces the valuable Carnauba Wax; this tree accommodates itself easily to climate and soil and can be interplanted with cotton, food or fodder plants, green manure, etc. To Coffee, Cocoa, Rubber, etc., it offers shade, but at the same time it allows sufficient light and air to pass to the trees below. Therefore the Wax Palm is not only a very useful but also a profitable acquisition.

For trials we supply on receipt of 7 shillings and 6 d., 75 seeds as sample of no value under registration, postage paid; on receipt of £ 4, we forward 10 lbs. seeds by parcel post, postage paid to all countries.

Detailed instructions for cultivation with every order.—

GEVEKOHT & WEDEKIND, Hamburg 1.

THE LOW-COUNTRY PRODUCTS ASSOCIATION OF CEYLON.

The annual report of this progressive body for 1912 is to hand, and contains a very full review of the past year's agricultural history of the Island.

The total membership of the Association now stands at 156, and will no doubt increase steadily.

The crops *par excellence* generally associated with the low country and which is the special care of the Association is the coconut, and the greater part of the report is naturally devoted to it. Other subjects dealt with are rubber, plumbago, cinnamon, and excise reforms, &c.

Visitors to the All-Ceylon Exhibition held in Colombo last year will recall the excellent display made by the Association. A resumé of the work done in this connection shows how well it played its part at this—the greatest show in the history of the Island.

We take the liberty of taking a number of extracts from this useful report, and take this opportunity of congratulating the Association on the valuable work it has done. [This had been unavoidably held over from an earlier issue.]

FARMERS OF FORTY CENTURIES.

By Mr. H. F. KING.

The chief object in this book by F. H. KING on agriculture in China, Korea and Japan is to show what soil is really capable of producing provided unremitting care and plant-food is lavished upon it. And the results are certainly astonishing as are the wonderful ways and means by which every scrap of waste, either animal or vegetable, is collected and stored up to be returned to the soil. In China with its swarming millions of population, where families are large and holding small, the strictest economy in all the branches of life have to be rigidly practised or famine stares them in the face. Roads are made the least possible width; banks between rice fields are made to bear crops of beans or peas; ridges are so arranged that they can be planted on both sides as well as in between; fruit trees are trained so as to take up the least possible room and at the same time producing the greatest possible number of fruit-bearing branches; whenever possible a second crop is sown in the first in order to save time such as cotton planted in the wheat, or clover in the rice or barley.

Sometimes there will be even triple crops growing at once such as wheat ready to harvest, beans two-thirds grown and cotton just planted. Even ponds are made to take their part, being either used to breed and fatten fish in or periodically drained and the rich vegetable deposit at the bottom used for compost.

These composts form a very important part of Chinese plant-food economy and are either formed by making pits in any waste corner of a field—preferably beside a canal or pond—and into it are thrown any coarse manure, ashes, roughage in the form of stubble, leaves, weeds, or other refuse on which is poured the liquid mud or ooze from canal or pond. When full

and well rotted it is transported to the fields. Another very useful purpose these pits serve is that by reason of the field draining into it they catch all the surface washing preserving them to be returned to the soil, instead of being washed out to sea and lost.

Another form of compost is obtained by making a stack of alternate layers of fresh clover or any other leguminous crop and liquid mud and plastering the whole carefully over with mud and leaving it to rot.

In Japan a somewhat more complicated form of compost is made by erecting a small building with a water-tight floor. In one half of the building the stack of greenstuff, straw or leaves and liquid mud is built up and kept moist to maintain a temperature below that of the body. Left to stand six weeks, it is then forked over to the other side and left for another period before it is ready for the fields.

Green manure is applied in the form of clover generally sown in rice or barley and after one or two cuts ploughed in. For vegetable gardens liquid manure is greatly used, receptacles are constructed for the reception of annual excrement which is soaked and then fed to the plants in a diluted form. Some of the photographs with which the book is profusely illustrated, show the wonderful size and great variety of the vegetables that answer to this careful treatment. The author gives a list of nearly seventy varieties of vegetables he saw exposed for sale in one market alone—a collection which would surely put Covent Garden to shame.

Naturally with all this great expenditure of labour and plant-food large returns are expected and besides the two crops of rice grown each year another crop or even two, of cabbage, rape, peas or beans, are obtained from the land making 3 or 4 crops a year from the same field.

One thing the author particularly notices and that is the scarcity of flies which he attributes to this constant clearing up and usage of all waste and garbage the breeding place of these plague-carrying pests. Therefore the general health of the people should benefit greatly.

In some countries, as for example Egypt, where flies swarm and in consequence opthalmia is paramount, the filth lying around and in the villages is indescribable. The fellah makes no attempt at the systematic collection of human or cattle waste such as the Chinese practise, but wherever the filth of generations happens to collect, it is removed and spread on the fields. But in Egypt they have great villages consisting mainly of pigeon-cots for the collection of the valuable guano and of this practice existing in China the author makes no mention.

As regards rice cultivation, transplanting seems to be the method chiefly in vogue although according to the author's statistics the yield seems to be no greater than that obtained in Egypt where the rice is sown broadcast. In Egypt Japanese rice will yield 80 bushels to the acre which is apparently only the best it can do in Japan and China when highly fertilized together with the added cost of labour for transplanting.

Straw and roots are greatly used as a fertilizer by laying it between the rows of rice and trampling it with the feet into the soft mud to rot.

There is a chapter with useful hints on silk culture and another on tea. Straw, leaves and weeds are used in Japan as a heavy mulch all over hill-side tea, to prevent soil wash, conserve moisture, to help the rain to enter the soil uniformly, and to act as a fertilizer when rotted.

The author thinks tea has an assured future, what with the increasing population of the West and of Colonies such as Australia and New Zealand where tea cannot be grown and where poor or foreign immigrants who could not afford and were not used to tea, are becoming rich enough to afford it and by contact with tea-drinkers acquiring the taste for it. Especially is this the case in cold countries such as America and Canada, where hot drink is such a compost and necessity. The origin of tea-making the author traces as far back as 2,000 B.C. and to the hygenic need of rendering boiled water palatable for drinking purposes.

One of the chief objects of the book seems to be to warn big and growing countries such as the United States, which may in the future have a great population to support, to endeavour in some way to save the enormous waste of soil-wash carried away to the sea by such great rivers as the Mississippi, whence neither money nor prayer can recall it.

The book contains many most useful hints to the small farmer, the vegetable grower and gardener, in making little yield much and in the economy of all waste; the moral of the book, learnt from the East, undoubtably being "Waste not, want not!"

D. S. C.

AMBERGRIS FINDS.

CHRISTCHURCH (New Zealand), Jan. 1913.

What is described as a record lump of ambergris (a secretion in the bodies of whales resulting from disease) has been discovered by Captain Larsen of the steam whaler "NORVEGIA." Ambergris, which is sometimes found floating in the sea, is highly valued as a basis in perfumery. An enormous whale was harpooned by a boat's crew, and nearly half a ton of the precious substance was taken from its body. An expert chemist has pronounced it to be real ambergris and worth about 60,000*l*.—DAILY MAIL, February 19.

Christchurch, N. Z., February 18,—The whaler "NORVEGIA," which arrived here to-day made a great strike. From the whales which she captured the crew obtaind nearly half a ton of ambergris, which is believed to break all records. It is stated that the ambergris is worth $300,000.—N. Y. COMMERCIAL.

These paragraphs are interesting; first, as showing how some American newspapers get their cabled news, and second, to the perfumery and drug markets. If the find of ambergris weighs half a ton, it is the biggest thing of the kind that has ever been known; but we do not believe it is so heavy as 17,920 oz.; the alleged price, 60,000*l*. indicates about half that weight, and a liberal discount would need to be allowed off that. One thing is certain: that the authentic history of any big find of ambergris is not learnt

until it has all been disposed of in such a way as not to disturb the market. We have from time to time reported on these finds—e.g., in the *C. & D.*, 1891, II., 587, and in the following issue the story was told by a broker how he received and sold a barrel of ambergris weighing 3 cwt. (5,376 oz.). The last big find was on March 5, 1911, when 160 lb. was collected, but not in one piece.

Ambergris is a subject of perennial interest, but as regards its origin little more is known to-day than was known in the eighteenth century, as the following reprint of an official document of that period shows:—

ON THE PRODUCTION OF AMBERGRIS.

A communication from the Committee of Council appointed for the consideration of all matters relating to Trade and Foreign Plantations; with a prefatory letter from William Fawkener, Esq., to Sir Joseph Banks, Bart., P.R.S.

Read January 20, 1791.

To SIR JOSEPH BANKS, Bart.

Office of Committee of Privy Council for Trade,

Whitehall, 15th January, 1791.

SIR,—Lord Hawkesbury, President of the Committee of Privy Council appointed for the consideration of all matters relating to Trade and Foreign Plantations, having received a letter from Mr. Champion, a Principal Merchant concerned in the Southern Whale Fishery, informing him that a ship belonging to him had lately arrived from the said fishery which had brought him home 302 ounces of ambergris, found by Mr. Coffin, captain of the said ship, in the body of a female spermaceti whale, taken on the coast of Guinea, his Lordship thought fit to desire Captain Coffin, as well as Mr. Champion, to attend the Lords of the Committee, that they might be examined concerning all the circumstances of the fact before mentioned; and I am directed by their Lordships to transmit to you a copy of the examination of these two gentlemen that you may communicate the same to the Royal Society, if you should think that any of the circumstances stated in this examination will contribute to remove the doubts hitherto entertained concerning the natural history and production of this valuable drug. I send you also a piece of the ambergris so taken out of the whale, and some of the bills of the fish, called squids (which are supposed to be the food of spermaceti whales), and which were found partly in the ambergris taken from this female whale and partly on the outside of it and adhering to it.

I have the honour to be, etc.,

W. FAWKENER.

At the Council Chamber, Whitehall, the 12th January, 1791.

By the Lords of the Committee of Council appointed for the consideration of all matters relating to Trade and Foreign Plantations.

Read—Letter from Mr. Alexander Champion, a principal merchant concerned in the Southern Whale Fishery, to Lord Hawkesbury, dated the 2nd instant, acquainting his Lordship that Captain Joshua Coffin, of the ship The Lord Hawkesbury, lately arrived from the Southern Whale Fishery,

[illegible]

[illegible]

[illegible]

Q. Are the whales usually found singly, or in pairs, or in large numbers?—*A.* Usually in large numbers, which we call scools (*sic*), and particularly in the low latitudes. I have seen from fifteen to perhaps a thousand together.

Q. Have you any further information on this subject to give to the Committee?—*A.* We have generally observed that the spermaceti whale, when struck, voids her excrement; if she does not, we conclude that she has ambergris in her. I think ambergris most likely to be found in a sickly fish; for I consider it to be the effect or cause of some disorder.

Questions put to Mr. Champion.

Q. At what price does ambergris usually sell; and at what price did that taken by your ship sell?—*A.* A small quantity had lately sold at 25*s.* per ounce; but it was then very scarce Mine sold for 19*s.* 9*d.* per ounce. The whole quantity found in this whale was 362 ounces Troy. The people who bought it told me this was a larger quantity than was ever before brought at once to market. It has generally been sold at about 4 or 5 pounds at a time.

Q. For the use of what country was this ambergris bought?—*A.* I do not exactly know. It was bought by a broker, who told me that his principal, who purchased about one-half, bought it for exporation to Turkey, Germany, and France. The other half was purchased by the druggists in town.

INDIAN ITEMS.

The Journal of the Madras Agricultural Students' Union (a new quarterly) published in connection with the Coimbatore College should prove a useful medium for transmitting agricultural information, and for discussing local agricultural topics.

From it we cull the following news items:—

The first provincial Co-operative Conference was opened by the Governor of Madras on the 21st December last.

Mr. D. T. Chadwick, I.C.S., has assumed charge of the Office of Director of Agriculture.

Mr. T. B. Fletcher, F. Z. S., F. E. S. has succeeded Mr. Lefroy (now Professor of Entomology, South Kensington College of Science) as Imperial Entomologist.

In accordance with a resolution by the Board of Agriculture, a Sugarcane breeding station for all India has been established at Chettipalayam, about a mile away from the Coimbatore Farm. Dr. Barber, Government Botanist, has been appointed as the expert in charge on a salary of Rs.1,500/- per mensem for a period of 5 years, and has been given the following staff—an assistant Chemist, assistant Botanist, Farm Manager, Asst. Manager, and two fieldmen. A sum of Rs.65,000 has been voted for the work whch has already begun.

DEPARTMENT OF AGRICULTURE, BARBADOES.

The report of the Superintendent of this department (Mr. Bovell) for 1911-12 is largely taken up with a review of the work done in connection with sugar-cane and cotton improvement.

The method of packing cane cuttings in damp charcoal has proved very successful, as proved by a shipment which took 136 days to reach its destination.

Cotton experiments for improving quality of staple and quantity of produce have been continued. This work is chiefly done by selection of the best plants for seed, viz., those which are healthy, vigorous and cone-shaped, from four to six feet high, compact in habit with the central stalk having numerous lateral branches, short internodes and bolls at almost every internode. These are marked, and when the flowers are sufficiently matured, a number of bolls are bagged to prevent cross-fertilization. Later on, the bolls are examined to see which produce lint of the best length of staple.

The export of fruit to the United Kingdom is considerable. We read that 102 crates of mangoes containing 10,786 fruit, were sent out, and that these gave a nett profit to the shippers, after paying all expenses of $2\frac{1}{2}$ cts. each.

The staff has been strengthened by the appointment of Mr. W. Nowel who has specialised in Entomology and Mycology at the Royal College of Science, London, as assistant Superintendent of Agriculture.

NYASALAND PLANT PROTECTION REGULATIONS.

Under the "Plants Protection Ordinance, 1912," the Nyasaland Government has recently published import regulations to prevent the introduction of insect pests and fungus diseases.

The importation of cotton plants is prohibited, with the exception of cotton plants grown in Egypt, and cotton plants imported for experimental purposes by the Director of Agriculture, and packed in double bags or tins.

The importation of plants in general is subject to the following regulations :—

1. Every package containing plants imported into the Protectorate through the medium of the Post shall contain a statement containing the full names of the kind and variety, the country of origin, and the name and address of the

person or firm supplying such plants together with any certificate which may be prescribed by Schedules A or B. Such package shall be delivered by the Postal Department to the Agricultural Department, Zomba, for inspection and disinfection, if necessary. Such package shall, if in order, be delivered to the Post Office to be forwarded to the addressee without further postal charge. Any package of plants which does not contain the requisite statement and certificate, shall be liable to be confiscated or otherwise dealt with, as the Agricultural authority may determine.

2. When plants are intended to be imported, otherwise than through the medium of the Post, a statement containing the full names and the kind and variety, the country of origin and the name and address of the person or firm, supplying such plants together with any certificate which may be prescribed by Schedules A or B, shall be posted to the Controller of Customs. Such statement and certificate shall be despatched by the consignor in sufficient time to enable it to reach the Controller of Customs one month in advance of the consignment. Plants which reach the Port of Entry, for which the necessary statement and certificate have not been received shall be detained, pending the receipt of the statement and certificate as aforesaid, and if such are not received within one month subsequent to the arrival of the plants, the whole consignment shall be liable to be confiscated or otherwise dealt with, as the Agricultural authority may determine. When plants are imported by persons entering the Protectorate, the importer shall declare the same to the Customs Officer, giving the information required above, and producing the certificate which may be prescribed by Schedules A or B. In the event of the statement and certificate being in order, all plants shall be disinfected, if considered necessary by the Agricultural authority at the Port of Entry, and allowed to proceed. Should any statement or certificate prove to be incorrect, the whole consignment shall be liable to be confiscated.

3. All plants shall be securely packed, and should any package become so damaged in the course of transit as to render it possible that any plant may escape therefrom, such package and any plant therein or therefrom, may at the discretion of the Agricultural authority be confiscated.

Schedule A, referred to above, enumerates those plants which may be imported only on production of a certificate from the Official Agricultural authority of the country from which the plants originated to the effect that they have been grown in areas known to be "free from diseases or pest, which characteristically attack such plants." At present it includes "Rubber of all varieties, Cacao, Coconuts, Rice, Tobacco, Potatoes, from all countries."

Schedule B enumerates plants which may be imported only if the permission of the Nyasaland Agricultural authority is first obtained. These at present are Coffee and Tea.

AGRICULTURE IN THE UNITED STATES.

A COMMISSION TO VISIT EUROPE.

Great interest is felt in the announcement reported in a recent telegram, that a large American country life Commission will, next summer, visit Europe and Ireland. The terms of reference under which the Commission will work are as follows :—

To inquire into the business organizations of agriculture in Europe. To examine the methods employed by progressive agricultural communities in production and marketing, and in the financing of both operations, noting—(*a*) the parts played respectively in the promotion of agriculture by Governments and by voluntary organizations of the agricultural classes; (*b*) the application of the co-operative system to agricultural production, distribution, and finance ; (*c*) the effect of co-operative action upon social conditions in rural communities ; (*d*) the relation of the cost of living to the organization of the food-producing classes.

The programme is supported by all who have given American agricultural conditions serious and unbiassed thought. It has been blessed by politicians of such different colours as the President, the ex-President, and Mr. Roosevelt. The movement of which it is the outcome, is indeed, of vast importance. It signifies a great change in national feeling. Even to admit the possibilities of rural co-operation is to confess readiness to jettison those principles of individualism and *laissez faire*, which have been a dominant factor in Anglo-Saxon agriculture in general and in Transatlantic agriculture in particular. Until lately the resources of the soil were deemed to be inexhaustible. If the farmer got tired of his farm he could try his hand at another trade ; if he had worked it out, he could take up some other land. It was the same with agriculture as with other national activities. Politics and legislation, the factory and the forest, the mine and the farm were all exploited without thought for the future. It was a state of affairs that could not last, and a marked feature of America's political and economic history during the last decade has been the efforts of the people to end it.

RURAL REFORMS REQUIRED.

From the broad national point of view the need for rural reform is perhaps even more urgent than the need for all that commonly goes by the name of social and industrial reform. It is, at any rate, the reform in which for obvious reasons, the outside world, and especially the English-speaking races, are most closely interested. The total increase in population was during the last decade 21 per cent., but while the urban population grew by 34·8 per cent., the rural community grew by only 11·2 per cent. The showing of the country side would be even worse were it not for the Far West, where the

era of colonization has not yet closed. In Gowa, Missouri, and some of the States of the Middle West, the agricultural stronghold of the country, the rural population has actually dwindled. In New England and the middle Atlantic States, there has been practically no growth of rural communities to compensate for an urban industrial growth that has been mainly due to an influx of socially undesirable aliens. Had the average of agricultural productivity increased, these statistics would lose some of their point ; but it has not increased. In 1899, 1900, and 1901 the average yield of an acre of corn was 25·3, 28·1, and 25·3 bushels ; in 1909, 1910, and 1911 the figures were 25·9, 27·7, and 23·9, in spite of exceptionally good seasons. That the production of corn has not fallen is due to the fact, that there has been a 20 per cent. increase in the acreage devoted to it. In regard to the more important wheat crop, the stagnation has been absolute. Productivity has not increased, averaging for the decade 14 bushels per acre, as compared with 29 bushels for Germany, 20·3 for France, and 33·0 for England. The area of cultivation remains stable, varying from year to year between 45 and 49 million acres.

DIMINISHED SUPPLIES AND EXPORTS.

Much the same story is told by the live stock returns. In 1910 there were roughly 62,000,000 cattle, 58,000,000 swine, and 52,000,000 sheep on the farms, whereas ten years earlier there had been 68,000,000 cattle, 62,500,000 swine, and 61,500,000 sheep. The direct result of all this is that the United States, while still but half inhabited according to old world standards, are in danger of having to go abroad for their food. They have, as the following official report shows, already forfeited their claim to be one of the great granaries and food stores of the world.

The rapid disappearance of meats and breadstuffs from exports of the United States is sharply illustrated by the figures of the calendar of 1912. They show, for example, an exportation of but 33,000 cattle in the calendar year 1912, against 164,000 in 1911, 277,000 in 1908, 494,000 in 1906 and 599,000 in 1904.

The value of the cattle exports of 1912 was but $3,000,000 (£600,000), speaking in round terms, against $14,000,000 (£2,800,000) in 1911, and $24,000,000 in 1908, $38,000,000 in 1906, and $41,000,000 in 1904, the 1912 exports being thus about 8 per cent. of the value of those exported in 1904, eight years earlier. The diminution in the cattle supply of the United States is also apparent in the fact that the importations of cattle in the year just ended amounted to over 3,000,000 in number, and their value to over $5,000,000, against but 16,000 in 1904, valued at $310,000. The figures of the Department of Agriculture showing the number of cattle on farms on January 1st, of each year place the number on January 1, 1912, at 58,000,000, against 72,500,000, in 1907.

The exports of meat show a marked falling off, especially those of fresh beef, of which the exports of the year were but 9,000,000 lb., against 29,000,000 in 1906, and 354,000,000 in 1901, the fresh beef exports of 1912 being less than 3 per cent. of those of 1901. In other meats there is a marked decline, though less proportionately than that in fresh beef. The total value of meat and dairy products exported in the year, approximated $145,000,000 (£29,000,000) against $181,000,000 (£36,200,000) in 1908 and $209,000,000 (£41,800,000) in 1906.

Breadstuffs exported in 1912, while showing a larger total than in 1911, are far below those of earlier years, the total for the calendar year 1912 approximating $165,000,000 (£33,000,000), against $215,000,000 (£43,000,000) in 1907 and $277,000,000 (£55,400,000) in 1901.

In 1900, to put the comparison on the basis of the Census figures, breadstuffs and foodstuffs constituted 40 per cent., and 10·8 per cent. of total exports, and in 1910, 21·5 per cent. and 7·6 per cent,

But enough has been said to establish the importance of the rural reform movement. If American civilization is not to become one-sided, if commercial and social development is to be orderly, the tendency towards excessive urbanism must be checked, and the productivity of the soil must be enhanced. It is illogical that the United States should already be confronted with the problems of an overcrowded industrial State; that their towns should be filled with an undigested, underpaid, and restless proletariat, while their farms are short of labour, and the acreage of unimproved land runs into hundreds of thousands. Nor is the public any longer unaware of the dangers and inconveniences of the situation. There has been a widespread tendency, during the past year to shift the blame for high prices, from the tariff to the farm, and contemporary industrial unrest has made of "excessive urbanism" a national bogey. Unfortunately, as will be shown in another article, the movement has yet to crystallize into a definite and accepted plan.—THE MAIL.

LOAN BANKS IN JAMAICA.

At the time of publishing the December Journal, the matter of the Government furnishing loans to planters who have suffered much loss by the storm, some indeed in the west end, their all except their land, was under consideration. It has since been decided on, that this will be done to small settlers who are free-holders, through local Loan Banks. Large planters will be able to borrow direct from the Government. As it obviously requires some kind of organization to deal with loans, on a wide scale to small settlers, and plainly, organizations whose managers will be closely in touch

with those borrowing, intimately acquainted with them and their circumstances, will be most useful. It has been decided to use the existing organizations of local Loan Banks established mostly by the members of our local Branch Societies, yet distinct from these, and where these do not at present exist, to establish them and get them organized with the greatest possible expedition. To do this, the Government in a comprehensive and practical way, a way well calculated to meet an emergency like the present circumstances of planters, (and be ready to meet any future emergency of a similar nature), a simple yet most efficient way it seems to us if properly worked, proposed to amend the recently passed Agricultural Loan Societies Law (published in the Journal for August page 435) so that capital furnished by members of the Bank may be dispensed with at first. At a special meeting of the Legislative Council held in the middle of December, a fresh Law entitled "The Agricultural Societies (Special Loans) Law," was passed.

Loan Banks, without Government aid, require the members to take shares, say of £5 each, and if there are 50 members that is a capital of £250. All the members would not require loans at one time of course, or if they all did want them, the loans are granted in priority of time of lodging of application, and if funds are insufficient for all, small loans have priority over large loans.

So from the £250 loans, to help members in need, may be given out. One man may require £5 to buy a heifer, another £20 to buy a shaft mule, another £8 to plant an acre of bananas, another £20 to help build a house. This system, entirely one of local co-operation, the best system in theory and the most independent and admirable, is a very slow one where small land owners are mostly poor and conservative, slow to understand and adopt ideas and projects new to them. The Loan Banks Law passed last May was an endeavour to get such banks in general operation sooner than if districts were left to themselves.

Under the Agricultural Loan Societies Law referred to, (the Law passed an May last) the Government could advance a local Loan Bank, duly organized, up to two-thirds of its share capital without the shares being actually paid up in cash by members. In this way, banks could have been easily and quickly established.

The Government and Legislative Council, amended that Law.
The amended Law is, shortly :—

1. That Loans will only be given through an Agricultural Bank which must be organized, and only members can borrow from it.
2. That the local Loan Bank can borrow from the Government up to twenty times its share capital, i. e., if members take shares up to £100, the bank could borrow if need be £2,000 on that capital.

3. That each borrower must take shares equal to one twentieth of his proposed loan i.e., a man wanting a loan, of £100 would require to take shares to the value of £5. A man borrowing £20 would require to hold at least one share. Banks may make their shares £5, but not less than £1.
4. That these shares do not require to be paid cash down, but can be paid at the rate of 2 per cent. per share per month. A man with a £5 share would thus be called upon to pay 2s. per month until his £5 was paid up. Of course those who can pay up at once can do so.
5. Security in value must be given for the loan borrowed. A man borrowing £20 would give his land crops in security up to that value.
6. No man can borrow more than he has value in security for. The total amount that may be borrowed by one person is £200.
7. Interest at the rate of 6 per cent. per annum, must be paid on the amount borrowed.
8. That two years is given for repayment of the loan.

The whole organization of the Loan Banks is separate and distinct from the Jamaica Agricultural Society, and is placed under a new Board called the Agricultural Loan Societies Board.

WASTE ON THE PLANTATION.

Waste on the farms totals a sum almost unthinkable in its magnitude. It is true that under present conditions, much of the waste cannot be helped. But a good eagle lost through a hole in the pocket is as much a loss as one deliberately tossed into the sea. The remedy would be to locate the hole and sew it up. Not long ago the Agricultural Commissioner of the Rock Island system, published the statement that cornstalks made into ensilage were worth 60 per cent. of the value of the grain, and that by wasting their stalks the farmers were losing $1,000,000,000 a year. It would not be necessary to look further, if one were after an illustration of agricultural suicide. But another instance can be seen in the present wasteful system of ginning and baling cotton, together costing the planters an unnecessary $10 a bale, which on the crop of 1912 would aggregate at least $135,000,000. Many good farmers have their seed plots and cross fertilize their seed plants with the care shown by a breeder of race horses. But the majority shovel their seed from the bin at planting time, sell the large potatoes and plant the little culls. Applying to the crops of 1912, merely the difference in yield estimated by the Department of Agriculture [U. S. A.] between the use of heavy-weight and light weight seed, this would make a difference of $750,000,000. The Department of Agriculture is sponsor for the statement that 1,000,000 tons of tow could be saved from the flax straw that is now burned. In the grain States after threshing, the straw is bruned to get rid of it ; $70,000,000 gone up in smoke!—BRADSTREET'S.

ANGORA GOATS IN THE UNITED STATES.

There are a million Angora goats in America, and yet we import annually over 30 per cent. of the mohair used in our domestic manufactories. The banner goat farm of America is located in Texas and numbers 10,000 head of grade and pure bred Angoras. Last year the owner of this ranch realised a nett profit of $1 per animal from his flock. There are several other pretentious goat farms throughout New Mexico, California and Oregon. The largest goat ranch in the Mississippi valley has 2,000 head, but the average flock in this country, is from 100 to 500 animals. The custom is to shear the goats early in April. Ordinary hair sells from 35 to 55 cents a pound. This common grade of mohair, which commands no especially high price, is that whose length is less than twelve inches; the ordinary fleece of one year's growth measures about ten inches in length. The average mature doe will shear from six to nine pounds of mohair each year, while the full-grown buck will yield from ten to fifteen pounds. Previous to shearing, the flock is graded into classes of does, bucks, kids and wethers. The fleeces are marketed according to their classification. The American Angora Goat Association, maintains a special mohair warehouse in Boston where the fleeces of practically all the Angoras in this country are marketed. At this depôt the fleeces are carefully cleaned, regraded if necessary, and baled ready for consignment to the manufacturing plants, where the raw mohair is converted into clothing, rugs, book bindings, shoes and gloves. One very beautiful fleece which was twenty-two inches in length sold for $6·50 a pound, the record price for raw mohair in this country. Four dollars a pound is about the ordinary top figure.—FARM AND FIRESIDE.

FOOT-AND-MOUTH DISEASE.

DANGER OF HAY AND STRAW PACKING.

The Board of Agriculture and Fisheries desire to call attention to the possible risk of Foot-and-Mouth Disease being introduced into Great Britain by means of hay and straw used for the packing of foreign imported goods, states the *Journal of the Board of Agriculture.*

This question was considered by the Departmental Committee appointed by the President of the Board to inquire into Foot-and-Mouth Disease in Great Britain. In their Report the Committee pointed out that numerous imported articles are packed in hay or straw, and that a large proportion of this packing ultimately reaches the farm as manure. The Committee considered that this packing constitutes a source of danger, but in view of the serious dislocation of general trade which the prohibition of its use would entail, they were not prepared, unless there is further evidence, to advise such a course. The Committee, however, recommended that persons using such hay and straw should be warned of the element of danger which it contains, and of the risk of allowing it to come in contact with any animals; they also advised that where possible it should be burned.

The Board hope that, with a view to minimising the risk referred to, manufacturers and traders, and all who receive hay and straw used for the packing of foreign imported goods, will take the necessary steps to prevent this packing material being sent to farms or other places where it can come into contact with live stock, and will make arrangements for the burning of such material.

Pamphlets for Tropical Planters.

A. M. & J. Ferguson are Agents for the sale of the following Circulars issued by Departments of Agriculture in the East, *viz:—*

Circulars of the Royal Botanic Gardens, Peradeniya, Ceylon, at 4d each, post free.

Over 100 of these have been published, full list on Application. The latest issued are:—

The Heneratgoda Tapping Experiments for 1911, by R. H. Lock.
The Rubber Planting Industry of Ceylon and the Incision Method of Tapping, by R. H. Lock.
Cacao Cultivation in Ceylon, by R. H. Lock.
Report on Experiments in manuring old Cacao, at Peradeniya between 1903 and 1911, by R. H. Lock.
Notes on the Tapping of Hevea Brasiliensis by the Method of Paring, by R. H. Lock.
A Root Disease of Hevea, by T. Petch.
Effect of Different Intervals between Successive Tappings of Rubber, by M. Kelway Bamber and T. Petch.
Brown Root Disease, T. Petch.
Experimental Tea Plots, Peradeniya.
Cotton Growing in Ceylon.
Cacao & Hevea Canker, by T. Petch
Root Diseases of Tea, by T. Petch.
A Visit to a Rubber Factory, by J. C. Willis.
Cymbopogon Grass Oils in Ceylon.

Bulletins of the F.M.S. Department of Agriculture, 8d each, post free.

Notes on Termes Gestroi and other species of Termites found on Rubber Estates in the Federated Malay States: by H. C. Pratt.
Root Diseases of Hevea Brasiliensis, the Para Rubber Tree: by W. J. Gallagher
Observations on Termes Gestroi as affecting the Para Rubber Tree, and Methods to be employed against its Ravages: by H. C. Pratt.
A Lepidopterous Pest of Coconuts, Brachartona catoxantha Hemps. (Zygaendæ): by H. C. Pratt.
Coffee Robusta: by W. J. Gallagher.
Die-Back Fungus of Para Rubber and of Cacao by Keith Bancroft, Assistant Mycologist.
Coconut Cultivation in the F.M.S., by L. C. Brown.
The Die-Back Disease of Para Rubber and a note on the Leaf Diseases of Para Rubber: by Keith Bancroft, B.A., Assistant Mycologist, F.M.S.
The Story of the Rubber Industry in Malaya, by H. N. Ridley and Appendix by L. Lewton Brain.
Camphor from Cinnamomum Camphora (The Japanese Camphor Tree) Cultivation and Preparation in F.M.S. by B. J. Eaton.
The Preparation of Plantation Para Rubber, by B. J. Eaton.

Indian Tea Association. The Spotting of Plantation Para Rubber: by Keith Bancroft.
Bark Eating Borers of Tea. By C. B. Antram (9*d*).
Report on Diseases in Tea Seed Nurseries, by G. D. Hope and P. H. Carpenter (8*d*.)
Experiments on the Quality of Tea, by G. D. Hope (1/1*d*).
Note on Cultivation of Tea Soils, G. D. Hope (7*d*).
Experiments in heavy Pruning in Assam, by H. H. Mann (1/1).
The "Red Slug" Caterpillar, by Mann and Antram (1/1)
Red Rust, a serious Blight of the Tea Plant, by Mann & Hutchinson (2/0.)
The Tea Soils of Cachar and Sylhet (1/8.)
Investigations as to Causes of Taints in Packed Tea, by C. M. Hutchinson (9*d*.)
Thrips Insects of Tea in Darjeeling, by C. B. Antram (9*d*.)
Mosquito Blight of Tea, Parts II and III by H. H. Mann (9*d*.) each.
do do Investigations during 1907-8 (9*d*.)
do do do do 1908-9 (6*d*.)
Blister Blight of Tea, by Harold Mann (11*d*.)
Tea Soils of North-East India and their Treatment, by H. H. Mann (3/8)
Firing of Tea. Part 1. (9*d*.)

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